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Vol. XLIII DECEMBER, 1953 Number 5, Part I

ARTICLES

Mathematical, or "Linear," Programming: A Nonmathematical Exposition — *Robert Dorfman* 797

Vertical Equilibrium under Pure Quality Competition — *Lawrence Abbott* 826

"Realism" in Policy Espousal — *Clarence Philbrook* 846

"Full Employment" 1955-1960—A Feasibility Test — *R. S. Weinberg* 860

COMMUNICATIONS

Additional American Reprints of Economic Writings 1776-1848 — *Esther Lowenthal* 884

Welfare Comparisons and Changes in Tastes — *Jerome Rothenberg* 885

A Theory of Excise Subsidies:
Comment — *Lawrence Abbott* 890
Reply — *E. R. Rolph* 895

Elasticities, Cross-Elasticities, and Market Relationships:
Comment — *William Fellner* 898
Comment — *E. H. Chamberlin* 910
Reply — *R. L. Bishop* 916

BOOK REVIEWS

ABBOTT, *The Federal Debt: Structure and Impact*, by E. R. Rolph 962
ALEXANDROWICZ, *International Economic Organizations*, by E. Marcus 983
BELL, *A History of Economic Thought*, by R. Campbell 939
BINDER, *Internationale Regulierungen auf dem Weltweizenmarkt*, by K. Brandt .. 999
BLACK, *Introduction to Economics for Agriculture*, by S. Hoos 995

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BRESSLER, *City Milk Distribution*, by R. Cox 985
FABRICANT, *The Trend of Government Activity in the United States since 1900*, by J. M. Buchanan 960
FISHER, *The Harvest Labor Market in California*, by A. Rees 1002
FRIEDLAENDER and OSER, *Economic History of Modern Europe*, by J. W. Chisholm 944
GABILLARD, *La fin de l'inflation*, by M. Bronfenbrenner 957
GRODINSKY, *Investments*, by D. R. Fuller 959
GUITTON, *L'objet de l'économie politique*, by P. R. Senn 933
HALCROW, *Agricultural Policy of the United States*, by E. Feder 998
HENNIG, *Entflechtung und Neuordnung der westdeutschen Montanindustrie unter besonderer Berücksichtigung der Verbundwirtschaft zwischen Kohle und Eisen*, by H. C. Wittgenstein 989
HUTCHISON, *A Review of Economic Doctrines 1870-1929*, by C. G. Uhr 936
JOHNSON and KROOSS, *The Origins and Development of the American Economy*, by L. R. Sorenson 945
KATONA, *Psychological Analysis of Economic Behavior*, by R. P. Mack 931
KINDLEBERGER, *International Economics*, by D. D. Humphrey 980
KLIEN, *A Textbook of Econometrics*, by R. M. Solow 947
KNOWLES, *Strikes: A Study in Industrial Conflict—with Special Reference to British Experience Between 1911 and 1947*, by K. M. Thompson 1003
KUZNETS, *Economic Change: Selected Essays in Business Cycles, National Income, and Economic Growth*, by G. Ackley 951
MACHLUP, *The Political Economy of Monopoly* and *The Economics of Sellers' Competition*, by W. Fellner 927
MCKINSEY, *Introduction to the Theory of Games*, by S. Reiter 950
MEADE, *A Geometry of International Trade*, by D. B. Marsh 974
MEDLICOTT, *The Economic Blockade*, Vol. I, by R. E. Smith 990
NIEHANS, *Ausgleichsgesetze der Amerikanischen Zahlungsbilanz*, by J. H. Furth 979
NOURSE, *Economics in the Public Service—The Intimate Story of the First Six Years of the Employment Act*, by J. M. Clark 953
PENROSE, *Economic Planning for the Peace*, by L. D. Stinebower 969
PETRIE, *The Taxation of Corporate Income in Canada*, by H. E. Brazer 967
RHYS-WILLIAMS, *Taxation and Incentive*, by J. K. Butters 964
ROBERTSON, *Utility and All That, and Other Essays*, by H. S. Ellis 925
RÖPER, *Die Konkurrenz und ihre Fehlentwicklungen, Untersuchungen über die Störungen der Marktwirtschaft*, by W. Froehlich 934
SCHULTZ, *The Economic Organization of Agriculture*, by J. H. Street 999
SEERS and ROSS, *Report on Financial and Physical Problems of Development in the Gold Coast*, by C. Rollins 946
SMITH, *Economic Aspects of the Second Bank of the United States*, by B. Mitchell 943
SOLOMONS, editor, *Studies in Costing*, by L. R. Chenault 987
VINER, *International Trade and Economic Development*, by J. H. Adler 972
WORCESTER, *Fundamentals of Political Economy*, by K. de Schweinitz, Jr. 941
Instability in Export Markets of Under-Developed Countries, by E. J. Mishan .. 975
Review of Small Business. Final Report of the House Select Committee on Small Business, by R. J. Sampson 992
World Airline Manual, 1952, by J. P. Carter 994

OTHER DEPARTMENTS

Titles of New Books 1006
Periodicals 1020
Notes 1034

OLIVER MITCHELL WENTWORTH SPRAGUE

Thirty-ninth President of the American Economic Association, 1937

Oliver M. W. Sprague was born in Somerville, Massachusetts, April 22, 1873. He died in Boston on May 24, 1953.

He attended St. Johnsbury Academy in Vermont before entering Harvard College. From Harvard he received his B.A. degree, *summa cum laude*, in 1894, his A.M. in 1895, and his Ph.D. in 1897. (He was awarded Litt.D. degree by Columbia in 1938.) After a year of study in England, he returned to Harvard as an assistant in economics. He served as instructor 1900-04 and as assistant professor 1904-05, became professor of economics at the Imperial University in Japan in 1905; returned to the newly established Harvard Graduate School of Business Administration in 1908; and was appointed Edmund Cogswell Converse professor in 1913, which post he occupied until 1941, when he became professor *emeritus*.

From 1930-33, Professor Sprague was granted leave to serve as economic adviser to the Bank of England, and in the early months of the New Deal, he served as financial and executive assistant to the Secretary of the United States Treasury. At other times he was adviser to the Reichsbank, the Bank of France, the Bank for International Settlements, and the League of Nations.

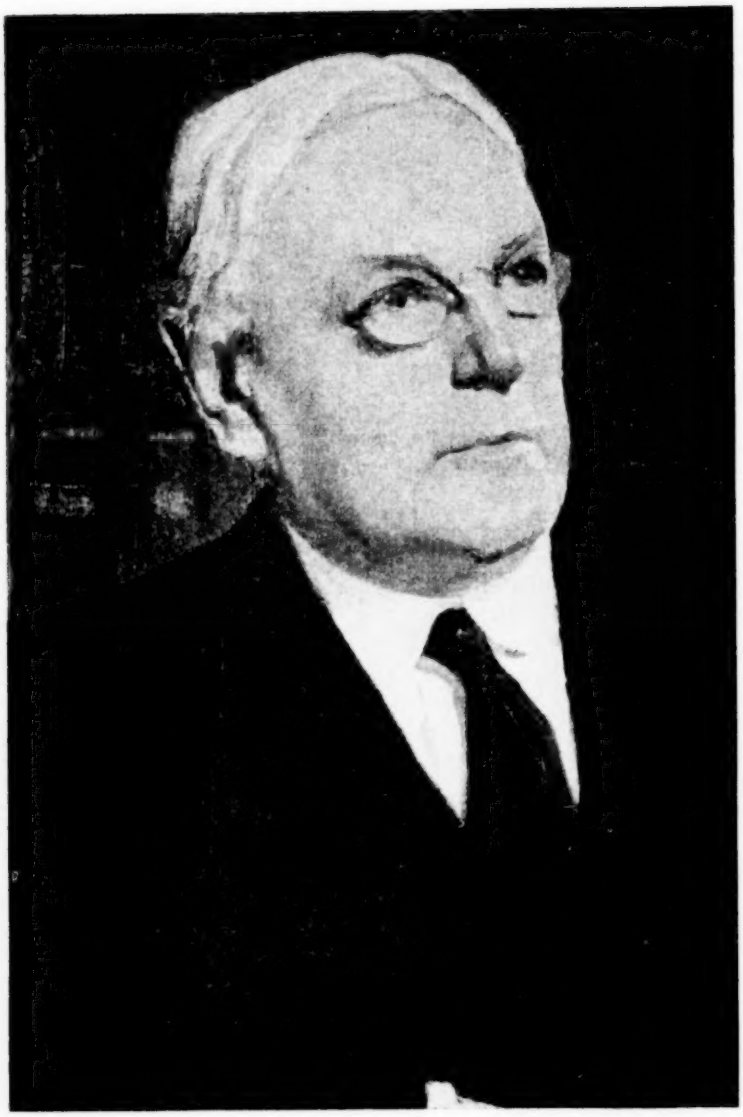
As a member of the Gold Delegation of the League of Nations and in his subsequent advisory role, Professor Sprague participated in final efforts to maintain the gold standard. He split with the New Deal in November, 1933, over the best means of promoting economic recovery.

Professor Sprague's advice was also sought by private organizations. At the time of his death, he was director of the National Shawmut Bank of Boston and a member of the advisory board of the Massachusetts Investors Trust. Until shortly before his death he was also an adviser to the General Motors Corporation on foreign exchange problems.

When Professor Sprague served as President of the American Economic Association, he started an innovation in program planning for the annual meetings. With the exception of one session devoted to Marxian economics, the whole program (joint with the American Statistical Association) was centered on the general topic of savings and investment, the leitmotiv being expressed in the title of his presidential address, "The Recovery Problem in the United States."

Professor Sprague was a former president of the Harvard chapter of Phi Beta Kappa, a member of the American Academy of Arts and Sciences, and of the American Philosophical Society. He was the author of *History of Crises Under the National Banking System* (1910), *Banking Reform in the United States* (1911), *Theory and History of Banking* (1929), and *Recovery and Common Sense* (1934).

No. 39 of a series of past presidents of the Association.



H. Allen Spraque

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MATHEMATICAL, OR "LINEAR," PROGRAMMING: A NONMATHEMATICAL EXPOSITION

By ROBERT DORFMAN*

This paper is intended to set forth the leading ideas of mathematical programming[1] purged of the algebraic apparatus which has impeded their general acceptance and appreciation. This will be done by concentrating on the graphical representation of the method. While it is not possible, in general, to portray mathematical programming problems in two-dimensional graphs, the conclusions which we shall draw from the graphs will be of general validity and, of course, the graphic representation of multidimensional problems has a time-honored place in economics.

The central formal problem of economics is the problem of allocating scarce resources so as to maximize the attainment of some predetermined objective. The standard formulation of this problem—the so-called marginal analysis—has led to conclusions of great importance for the understanding of many questions of social and economic policy. But it is a fact of common knowledge that this mode of analysis has not recommended itself to men of affairs for the practical solution of their economic and business problems. Mathematical programming is based on a restatement of this same formal problem in a form which is designed to be useful in making practical decisions in business and economic affairs. That mathematical programming is nothing but a reformulation of the standard economic problem and its solution is the main thesis of this exposition.

The motivating idea of mathematical programming is the idea of a

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[1] The terminology of the techniques which we are discussing is in an unsatisfactory state. Most frequently they are called "linear programming" although the relationships involved are not always linear. Sometimes they are called "activities analysis," but this is not a very suggestive name. The distinguishing feature of the techniques is that they are concerned with programming rather than with analysis, and, at any rate, "activities analysis" has not caught on. We now try out "mathematical programming"; perhaps it will suit.

"process" or "activity." A process is a specific method for performing an economic task. For example, the manufacture of soap by a specified formula is a process. So also is the weaving of a specific quality of cotton gray goods on a specific type of loom. The conventional production function can be thought of as the formula relating the inputs and outputs of all the processes by which a given task can be accomplished.

For some tasks, *e.g.*, soap production, there are an infinite number of processes available. For others, *e.g.*, weaving, only a finite number of processes exist. In some cases, a plant or industry may have only a single process available.

In terms of processes, choices in the productive sphere are simply decisions as to which processes are to be used and the extent to which each is to be employed. Economists are accustomed to thinking in terms of decisions as to the quantities of various productive factors to be employed. But an industry or firm cannot substitute Factor A for Factor B unless it does some of its work in a different way, that is, unless it substitutes a process which uses A in relatively high proportions for one which uses B. Inputs, therefore, cannot be changed without a change in the way of doing things, and often a fundamental change. Mathematical programming focusses on this aspect of economic choice.

The objective of mathematical programming is to determine the optimal levels of productive processes in given circumstances. This requires a restatement of productive relationships in terms of processes and a reconsideration of the effect of factor scarcities on production choices. As a prelude to this theoretical discussion, however, it will be helpful to consider a simplified production problem from a commonsense point of view.

I. *An Example of Mathematical Programming*

Let us consider an hypothetical automobile company equipped for the production of both automobiles and trucks. This company, then, can perform two economic tasks, and we assume that it has a single process for accomplishing each. These two tasks, the manufacture of automobiles and that of trucks, compete for the use of the firm's facilities. Let us assume that the company's plant is organized into four departments: (1) sheet metal stamping, (2) engine assembly, (3) automobile final assembly, and (4) truck final assembly—raw materials, labor, and all other components being available in virtually unlimited amounts at constant prices in the open market.

The capacity of each department of the plant is, of course, limited. We assume that the metal stamping department can turn out sufficient stampings for 25,000 automobiles or 35,000 trucks per month. We can then calculate the combinations of automobile and truck stampings

which this department can produce. Since the department can accommodate 25,000 automobiles per month, each automobile requires 1/25,000 or 0.004 per cent of monthly capacity. Similarly each truck requires 0.00286 per cent of monthly capacity. If, for example, 15,000 automobiles were manufactured they would require 60 per cent of metal stamping capacity and the remaining 40 per cent would be sufficient to produce stampings for 14,000 trucks. Then 15,000 automobiles and 14,000 trucks could be produced by this department at full operation. This is, of course, not the only combination of automobiles and trucks which could be produced by the stamping department at full operation. In Figure 1, the line labeled "Metal Stamping" represents all such combinations.

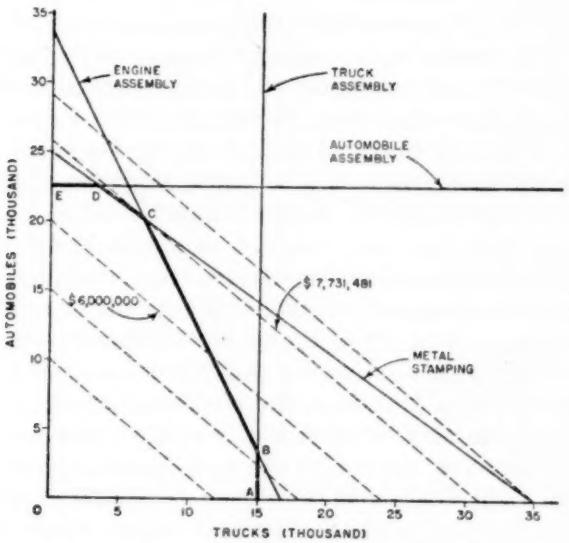

FIGURE 1. CHOICES OPEN TO AN AUTOMOBILE FIRM

Similarly we assume that the engine assembly department has monthly capacity for 33,333 automobile engines or 16,667 truck engines or, again, some combination of fewer automobile and truck engines. The combinations which would absorb the full capacity of the engine assembly department are shown by the "Engine Assembly" line in Figure 1. We assume also that the automobile assembly department can accommodate 22,500 automobiles per month and the truck assembly department 15,000 trucks. These limitations are also represented in Figure 1.

We regard this set of assumptions as defining two processes: the

production of automobiles and the production of trucks. The process of producing an automobile yields, as an output, one automobile and absorbs, as inputs, 0.004 per cent of metal stamping capacity, 0.003 per cent of engine assembly capacity, and 0.00444 per cent of automobile assembly capacity. Similarly the process of producing a truck yields, as an output, one truck and absorbs, as inputs, 0.00286 per cent of metal stamping capacity, 0.006 per cent of engine assembly capacity, and 0.00667 per cent of truck assembly capacity.

The economic choice facing this firm is the selection of the numbers of automobiles and trucks to be produced each month, subject to the restriction that no more than 100 per cent of the capacity of any department can be used. Or, in more technical phraseology, the choice consists in deciding at what level to employ each of the two available processes. Clearly, if automobiles alone are produced, at most 22,500 units per month can be made, automobile assembly being the effective limitation. If only trucks are produced, a maximum of 15,000 units per month can be made because of the limitation on truck assembly. Which of these alternatives should be adopted, or whether some combination of trucks and automobiles should be produced depends on the relative profitability of manufacturing trucks and automobiles. Let us assume, to be concrete, that the sales value of an automobile is $300 greater than the total cost of purchased materials, labor, and other direct costs attributable to its manufacture. And, similarly, that the sale value of a truck is $250 more than the direct cost of manufacturing it. Then the net revenue of the plant for any month is 300 times the number of automobiles produced plus 250 times the number of trucks. For example, 15,000 automobiles and 6,000 trucks would yield a net revenue of $6,000,000. There are many combinations of automobiles and trucks which would yield this same net revenue; 10,000 automobiles and 12,000 trucks is another one. In terms of Figure 1, all combinations with a net revenue of $6,000,000 lie on a straight line, to be specific, the line labelled $6,000,000 in the figure.

A line analogous to the one which we have just described corresponds to each possible net revenue. All these lines are parallel, since their slope depends only on the relative profitability of the two activities. The greater the net revenue, of course, the higher the line. A few of the net revenue lines are shown in the figure by the dashed parallel lines.

Each conceivable number of automobiles and trucks produced corresponds to a point on the diagram, and through each point there passes one member of the family of net revenue lines. Net revenue is maximized when the point corresponding to the number of automobiles and trucks produced lies on the highest possible net revenue line. Now the effect of the capacity restrictions is to limit the range of choice to

outputs which correspond to points lying inside the area bounded by the axes and by the broken line ABCDE. Since net revenue increases as points move out from the origin, only points which lie on the broken line need be considered. Beginning then with Point A and moving along the broken line we see that the boundary of the accessible region intersects higher and higher net revenue lines until point C is reached. From there on, the boundary slides down the scale of net revenue lines. Point C therefore corresponds to the highest attainable net revenue. At point C the output is 20,370 automobiles and 6,481 trucks, yielding a net revenue of $7,731,481 per month.

The reader has very likely noticed that this diagram is by no means novel. The broken line, ABCDE, tells the maximum number of automobiles which can be produced in conjunction with any given number of trucks. It is therefore, apart from its angularity, a production opportunity curve or transformation curve of the sort made familiar by Irving Fisher, and the slope of the curve at any point where it has a slope is the ratio of substitution in production between automobiles and trucks. The novel feature is that the production opportunity curve shown here has no defined slope at five points and that one of these five is the critical point. The dashed lines in the diagram are equivalent to conventional price lines.

The standard theory of production teaches that profits are maximized at a point where a price line is tangent to the production opportunity curve. But, as we have just noted, there are five points where our production opportunity curve has no tangent. The tangency criterion therefore fails. Instead we find that profits are maximized at a corner where the slope of the price line is neither less than the slope of the opportunity curve to the left of the corner nor greater than the slope of the opportunity curve to the right.

Diagrammatically, then, mathematical programming uses angles where standard economics uses curves. In economic terms, where does the novelty lie? In standard economic analysis we visualize production relationships in which, if there are two products, one may be substituted for the other with gradually increasing difficulty. In mathematical programming we visualize a regime of production in which, for any output, certain factors will be effectively limiting but other factors will be in ample supply. Thus, in Figure 1, the factors which effectively limit production at each point can be identified by noticing on which limitation lines the point lies. The rate of substitution between products is determined by the limiting factors alone and changes only when the designation of the limiting factors changes. In the diagram a change in the designation of the limiting factors is represented by turning a corner on the production opportunity curve.

We shall come back to this example later, for we have not exhausted its significance. But now we are in a position to develop with more generality some of the concepts used in mathematical programming.

II. *The Model of Production in Mathematical Programming*

A classical problem in economics is the optimal utilization of two factors of production, conveniently called capital and labor. In the usual analysis, the problem is formulated by conceiving of the two factors as cooperating with each other in accordance with a production function which states the maximum quantity of a product which can be obtained by the use of stated quantities of the two factors. One convenient means of representing such a production function is an "isoquant diagram," as in Figure 2. In this familiar figure, quantities of labor are plotted along the horizontal axis and quantities of capital

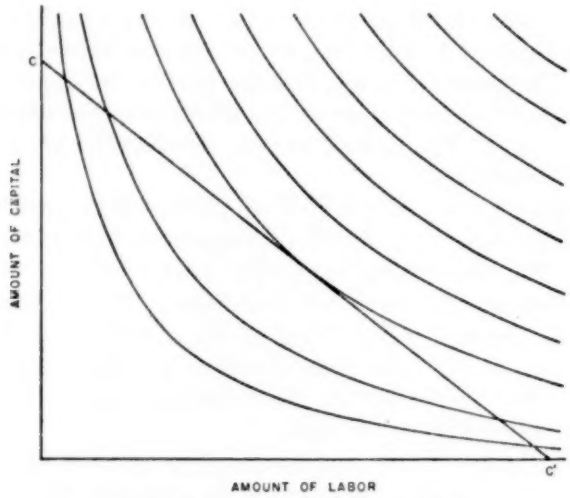

FIGURE 2. AN ISOQUANT DIAGRAM

along the vertical. Each of the arcs in the body of the diagram corresponds to a definite quantity of output, higher arcs corresponding to greater quantities.

If the prices per unit of capital and labor are known, the combinations of labor and capital which can be purchased for a fixed total expenditure can be shown by a sloping straight line like CC′ in the figure, the slope depending only on the relative prices. Two interpretations follow immediately. First, the minimum unit cost of producing the output represented by any isoquant can be achieved by using the combination of labor and capital which corresponds to the point where that

isoquant is tangent to a price line. Second, the greatest output attainable with any given expenditure is represented by the isoquant which is tangent to the price line corresponding to that expenditure.

This diagram and its analysis rest upon the assumption that the two factors are continuously substitutable for each other in such wise that if the amount of labor employed be reduced by a small amount it will be possible to maintain the quantity of output by a *small* increase in the amount of capital employed. Moreover, this analysis assumes that each successive unit decrement in the amount of labor will require a slightly larger increment in the amount of capital if output is to remain constant. Otherwise the isoquants will not have the necessary shape.

All this is familiar. We call it to mind only because we are about to develop an analogous diagram which is fundamental to mathematical programming. First, however, let us see why a new diagram and a new approach are felt to be necessary.

The model of production which we have just briefly sketched very likely is valid for some kinds of production. But for most manufacturing industries, and indeed all production where elaborate machinery is used, it is open to serious objection. It is characteristic of most modern machinery that each kind of machine operates efficiently only over a narrow range of speeds and that the quantities of labor, power, materials and other factors which cooperate with the machine are dictated rather inflexibly by the machine's built-in characteristics. Furthermore, at any time there is available only a small number of different kinds of machinery for accomplishing a given task. A few examples may make these considerations more concrete. Earth may be moved by hand shovels, by steam or diesel shovels, or by bulldozers. Power shovels and bulldozers are built in only a small variety of models, each with inherent characteristics as to fuel consumption per hour, number of operators and assistants required, cubic feet of earth moved per hour, etc. Printing type may be set by using hand-fonts, linotype machines or monotype machines. Again, each machine is available in only a few models and each has its own pace of operation, power and space requirements, and other essentially unalterable characteristics. A moment's reflection will bring to mind dozens of other illustrations: printing presses, power looms, railroad and highway haulage, statistical and accounting calculation, metallic ore reduction, metal fabrication, etc. For many economic tasks the number of processes available is finite, and each process can be regarded as inflexible with regard to the ratios among factor inputs and process outputs. Factors cannot be substituted for each other except by changing the levels at which entire technical processes are used, because each process uses factors in fixed characteristic ratios. In mathematical programming, accordingly, process substi-

tution plays a rôle analogous to that of factor substitution in conventional analysis.

We now develop an apparatus for the analysis of process substitution. For convenience we shall limit our discussion to processes which consume two factors, to be called capital and labor, and produce a single output. Figure 3 represents such a process. As in Figure 2, the horizontal axis is scaled in units of labor and the vertical axis in units of capital. The process is represented by the ray, OA, which is scaled in units of output. To each output there corresponds a labor requirement found by locating the appropriate mark on the process ray and reading straight down. The capital requirement is found in the same manner by reading straight across from the mark on the process line. Similarly, to each amount of labor there corresponds a quantity of output, found by reading straight up, and a quantity of capital, found by reading straight across from the output mark.

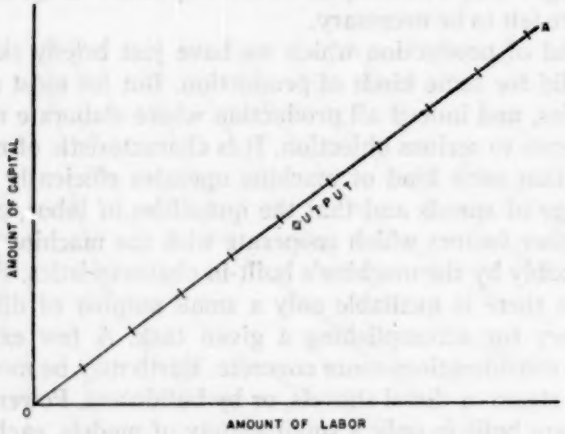

FIGURE 3. A PROCESS

It should be noted that the quantity of capital in this diagram is the quantity used in a process rather than the quantity owned by an economic unit; it is capital-service rather than capital itself. Thus, though more or less labor may be combined with a given machine—by using it more or fewer hours—the ratio of capital to labor inputs, that is, the ratio of machine-hours to labor hours—is regarded as technologically fixed.

Figure 3 incorporates two important assumptions. The fact that the line OA is straight implies that the ratio between the capital input and the labor input is the same for all levels of output and is given, indeed, by the slope of the line. The fact that the marks on the output line are

evenly spaced indicates that there are neither economies nor diseconomies of scale in the use of the process, *i.e.*, that there will be strict proportionality between the quantity of output and the quality of either input. These assumptions are justified rather simply on the basis of the notion of a process. If a process can be used once, it can be used twice or as many times as the supplies of factors permit. Two linotype machines with equally skilled operators can turn out just twice as much type per hour as one. Two identical mills can turn out just twice as many yards of cotton per month as one. So long as factors are available, a process can be duplicated. Whether it will be economical to do so is, of course, another matter.

If there is only one process available for a given task there is not much scope for economic choice. Frequently, however, there will be

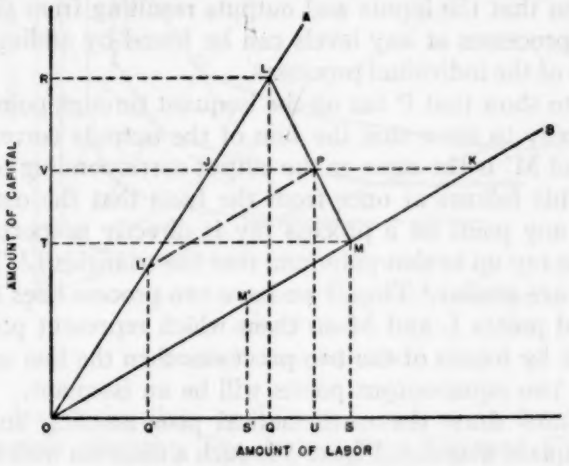

FIGURE 4. TWO PROCESSES

several processes. Figure 4 represents a situation in which two procedures are available, Process A indicated by the line OA and Process B indicated by OB. We have already seen how to interpret points on the lines OA and OB. The scales by which output is measured on the two rays are not necessarily the same. The scale on each ray reflects the productivity of the factors when used in the process represented by that ray and has no connection with the output scale on any other process ray. Now suppose that points L and M represent production of the same output by the two processes. Then LM, the straight line between them, will represent an isoquant and each point on this line will correspond to a combination of Processes A and B which produces the same output as OL units of Process A or OM units of Process B.

To see this, consider any point P on the line LM and draw a line

through P parallel to OB. Let L′ be the point where this line intersects OA. Finally mark the point M′ on OB such that OM′ = L′P. Now consider the production plan which consists of using Process A at level OL′ and Process B at level OM′.[2] It is easy to show that this production plan uses OU units of labor, where U is the labor coordinate of point P, and OV units of capital, where V is the capital coordinate of point P.[3]

Since the coordinates of point P correspond to the quantities of factors consumed by OL′ units of Process A and OM′ units of Process B, we interpret P as representing the combined production plan made up of the specified levels of the two processes. This interpretation implies an important economic assumption, namely, that if the two processes are used simultaneously they will neither interfere with nor enhance each other so that the inputs and outputs resulting from simultaneous use of two processes at any levels can be found by adding the inputs and outputs of the individual processes.

In order to show that P lies on the isoquant through points L and M it remains only to show that the sum of the outputs corresponding to points L′ and M′ is the same as the output corresponding to point L or point M. This follows at once from the facts that the output corresponding to any point on a process ray is directly proportional to the length of the ray up to that point and that the triangles LL′P and LOM in Figure 4 are similar.[4] Thus if we have two process lines like OA and OB and find points L and M on them which represent producing the same output by means of the two processes then the line segment connecting the two equal-output points will be an isoquant.

We can now draw the mathematical programming analog of the familiar isoquant diagram. Figure 5 is such a diagram with four process lines shown. Point M represents a particular output by use of Process A and points L, K, J represent that same output by means of Processes B, C, D, respectively. The succession of line segments connecting these

[2] An alternative construction would be to draw a line through point P parallel to OA. It would intersect OB at M′. Then we could lay off OL′ equal to M′P on OA. This would lead to exactly the same results as the construction used in the text. The situation is analogous to the "parallelogram of forces" in physics.

[3] Proof: Process A at level OL′ uses OQ′ units of labor, Process B at level OM′ uses OS′ units of labor, together they use OQ′ + OS′ units of labor. But, by construction, L′P is equal and parallel to OM′. So Q′U = OS′. Therefore, OQ′ + OS′ = OQ′ + Q′U = OU units of labor. The argument with respect to capital is similar.

[4] Proof: Let Output (X) denote the output corresponding to any point, X, on the diagram. Then Output (M′)/Output (M) = OM′/OM and Output (L′)/Output (L) = OL′/OL. By assumption: Output (L) = Output (M). So Output (M′)/Output (L) = OM′/OM. Adding, we have:

$$\frac{\text{Output (M′)} + \text{Output (L′)}}{\text{Output (L)}} = \frac{OM'}{OM} + \frac{OL'}{OL} = \frac{L'P}{OM} + \frac{OL'}{OL} = \frac{L'L}{OL} + \frac{OL'}{OL} = 1.$$

four points is the isoquant for that same output. It is easy to see that any other succession of line segments respectively parallel to those of MLKJ is also an isoquant. Three such are shown in the figure. It is instructive to compare Figure 5 with Figure 2 and note the strong resemblance in appearance as well as in interpretation.

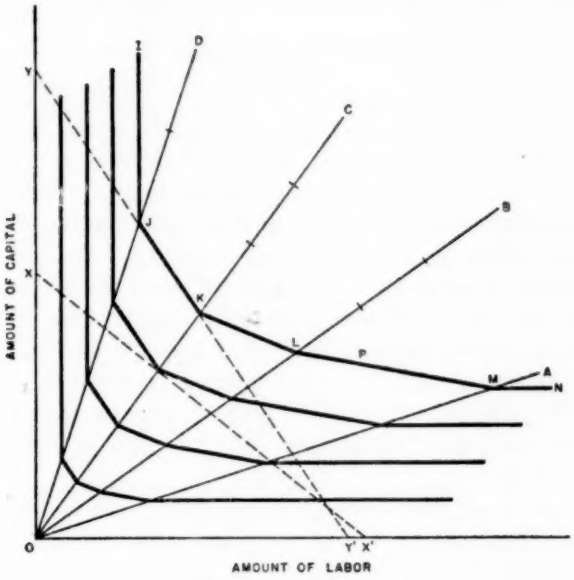

FIGURE 5. FOUR PROCESSES

We may draw price lines on Figure 5, just as on the conventional kind of isoquant diagram. The dashed lines XX′ and YY′ represent two possible price lines. Consider XX′ first. As that line is drawn, the maximum output for a given expenditure can be obtained by use of Process C alone, and, conversely, the minimum cost for a given output is also obtained by using Process C alone. Thus, for the relative price regime represented by XX′, Process C is optimal. The price line YY′ is drawn parallel to the isoquant segment JK. In this case Process C is still optimal, but Process D is also optimal and so is any combination of the two.

It is evident from considering these two price lines, and as many others as the reader wishes to visualize, that an optimal production program can always be achieved by means of a single process, which process depending, of course, on the slope of the price line. It should be noted, however, that the conventional tangency criterion is no longer applicable.

We found in Figure 5 that an optimal economic plan need never use

more than a single process for each of its outputs.[5] That conclusion is valid for the situation depicted, which assumed that the services of the two factors could be procured in any amounts desired at constant relative prices. This assumption is not applicable to many economic problems, nor is it used much in mathematical programming. We must now, therefore, take factor supply conditions into account.

III. *Factor Supplies and Costs*

In mathematical programming it is usual to divide all factors of production into two classes: unlimited factors, which are available in any amount desired at constant unit cost, and limited or scarce factors, which are obtainable at constant unit cost up to a fixed maximum quantity and thereafter not at all. The automobile example illustrates this classification. There the four types of capacity were treated as fixed factors available at zero variable cost; all other factors were grouped under direct costs which were considered as constant per unit of output.

The automobile example showed that this classification of factors is adequate for expressing the maximization problem of a firm dealing in competitive markets. In the last section we saw that when all factors are unlimited, this formulation can be used to find a minimum average cost point.

Both of these applications invoked restrictive assumptions and, furthermore, assumptions which conflict with those conventionally made in studying resource allocation. In conventional analysis we conceive that as the level of production of a firm, industry or economy rises, average unit costs rise also after some point. The increase in average costs is attributable in part to the working of the law of variable proportions,[6] which operates when the inputs of some but not all factors of production are increased. As far as the consequences of increasing some but not all inputs are concerned, the contrast between mathematical programming and the marginal analysis is more verbal than substantive. A reference to Figure 4 will show how such changes are handled in mathematical programming. Point J in Figure 4 represents the production of a certain output by the use of Process A alone. If it is desired to increase output without increasing the use of capital, this can be done by moving to the right along the dotted line JK, since this line cuts successively higher isoquants. Such a movement would correspond to using increasingly more of Process B and increasingly

[5] Recall, however, that we have not taken joint production into account nor have we considered the effects of considerations from the demand side.

[6] *Cf.* J. M. Cassels, "On the Law of Variable Proportions," in W. Fellner and B. F. Haley, eds., *Readings in the Theory of Income Distribution* (Philadelphia, 1946), pp. 103-18.

less of Process A and thus, indirectly, to substituting labor for capital. If, further, we assume that unit cost of production is lower for Process A than for Process B this movement would also correspond to increasing average cost of production. Thus both marginal analysis and mathematical programming lead to the same conclusion when factor proportions are changed: if the change starts from a minimum cost point the substitution will lead to gradually increasing unit costs.

But changing input proportions is only one part of the story according to the conventional type of analysis. If output is to be increased, any of three things may happen. First, it may be possible to increase the consumption of all inputs without incurring a change in their unit prices. In this case both mathematical programming and marginal analysis agree that output will be expanded without changing the ratios among the input quantities and average cost of production will not increase.[7] Second, it may not be possible to increase the use of some of the inputs. This is the case we have just analyzed. According to both modes of analysis the input ratios will change in this case and average unit costs will increase. The only difference between the two approaches is that if average cost is to be plotted against output, the marginal analyst will show a picture with a smoothly rising curve while the mathematical programmer will show a broken line made up of increasingly steep line segments. Third, it may be possible to increase the quantities of all inputs but only at the penalty of increasing unit prices or some kind of diseconomies of scale. This third case occurs in the marginal analysis, indeed it is the case which gives long-run cost curves their familiar shape, but mathematical programming has no counterpart for it.

The essential substantive difference we have arrived at is that the marginal analysis conceives of pecuniary and technical diseconomies associated with changes in scale while mathematical programming does not.[8] There are many important economic problems in which factor prices and productivities do not change in response to changes in scale or in which such variations can be disregarded. Most investigations of industrial capacity, for example, are of this nature. In such studies we seek the maximum output of an industry, regarding its inventory of physical equipment as given and assuming that the auxiliary factors needed to cooperate with the equipment can be obtained in the quanti-

[7] *Cf.* F. H. Knight, *Risk, Uncertainty and Profit* (Boston, 1921), p. 98.

[8] Even within the framework of the marginal analysis the concept of diseconomies of scale has been challenged on both theoretical and empirical grounds. For examples of empirical criticism see Committee on Price Determination, Conference on Price Research, *Cost Behavior and Price Policy* (New York, 1943). The most searching theoretical criticism is in Piero Sraffa, "The Laws of Returns under Competitive Conditions," *Econ. Jour.*, Dec. 1926, XXXVI, 535-50.

ties dictated by the characteristics of the equipment. Manpower requirement studies are of the same nature. In such studies we take both output and equipment as given and calculate the manpower needed to operate the equipment at the level which will yield the desired output. Studies of full employment output fall into the same format. In such studies we determine in advance the quantity of each factor which is to be regarded as full employment of that factor. Then we calculate the optimum output obtainable by the use of the factors in those quantities.

These illustrations should suffice to show that the assumptions made in mathematical programming can comprehend a wide variety of important economic problems. The most useful applications of mathematical programming are probably to problems of the types just described, that is, to problems concerned with finding optimum production plans using specified quantities of some or all of the resources involved.

IV. *Analysis of Production with Limited Factors*

The diagrams which we have developed are readily adaptable to the analysis of the consequences of limits on the factor supplies. Such limits are, of course, the heart of Figure 1 where the four principal lines represent limitations on the process levels which result from limits on the four factor quantities considered. But Figure 1 cannot be used when more than two processes have to be considered. For such problems diagrams like Figures 3, 4, and 5 have to be used.

Figure 6 reproduces the situation portrayed in Figure 5 with some

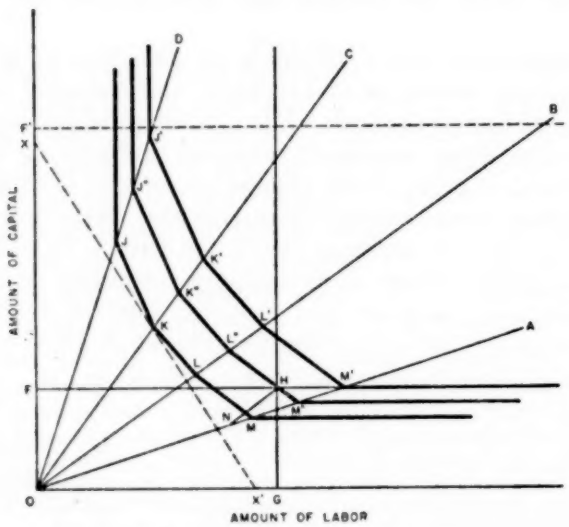

FIGURE 6. FOUR PROCESSES, WITH LIMITATIONS

additional data to be explained below. Let OF represent the maximum amount of capital which can be used and thus show a factor limitation. The horizontal line through F divides the diagram into two sections: all points above the line correspond to programs which require more capital than is available; points on and below the line represent programs which do not have excessive capital requirements. This horizontal line will be called the capital limitation line. Points on or below it are called "feasible," points above it are called "infeasible."

The economic unit portrayed in Figure 6 has the choice of operating at any feasible point. If maximum output is its objective, it will choose a point which lies on the highest possible isoquant, *i.e.*, the highest isoquant which touches the capital limitation line. This is the one labelled J′K′L′M′, and the highest possible output is attained by using Process A.

Of course, maximum output may not be the objective. The objective may be, for example, to maximize the excess of the value of output over labor costs. We shall refer to such an excess as a "net value." The same kind of diagram can be used to solve for a net value provided that the value of each unit of output is independent of the number of units produced[9] and that the cost of each unit of labor is similarly constant. If these provisos are met, each point on a process ray will correspond to a certain physical output but also to a certain value of output, cost of labor, and net value of output. Further, along any process ray the net value of output will equal the physical output times the net value per unit and will therefore be proportional to the physical output. We may thus use a diagram similar to Figure 6 except that we think of net value instead of physical output as measured along the process rays and we show isovalue line instead of isoquants. This has been done on Figure 7, in which the maximum net value attainable is the one which corresponds to the isovalue contour through point P, and is attained by using Process C.

It should be noted in both Figures 6 and 7 that the optimal program consisted of a single process, that shifts in the quantity of capital available would not affect the designation of the optimal process though they would change its level, and that the price lines, which were crucial in Figure 5, played no rôle.

The next complication, and the last one we shall be able to consider, is to assume that both factors are in limited supply. This situation is portrayed in Figure 6 by adding the vertical line through point G to represent a labor limitation. The available quantity of labor is shown, of course, by the length OG. Then the points inside the rectangle

[9] This is a particularly uncomfortable assumption. We use it here to explain the method in its least complicated form.

OFHG represent programs which can be implemented in the sense that they do not require more than the available supplies of either factor. This is the rectangle of feasible programs. The greatest achievable output is the one which corresponds to the highest isoquant which touches the rectangle of feasible programs. This is the isoquant J″K″L″M″, and furthermore, since the maximum isoquant touches the rectangle at H, H represents the program by which the maximum output can be produced.

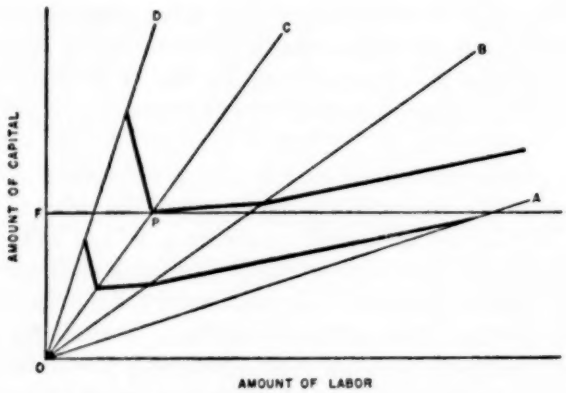

FIGURE 7. FOUR PROCESSES WITH ISOVALUE LINES

This solution differs from the previous ones in that the solution-point does not lie on any process ray but between the rays for Processes A and B. We have already seen that a point like H represents using Process A at level ON and Process B at level NH.

Two remarks are relevant to this solution. First: with the factor limitation lines as drawn, the maximum output requires two processes. If the factor limitation lines had been drawn so that they intersected exactly on one of the process rays, only one process would have been required. If the factor limitation lines had crossed to the left of Process D or to the right of Process A, the maximizing production plan would require only one process. But, no matter how the limitation lines be drawn, at most two processes are required to maximize output. We are led to an important generalization: maximum output may always be obtained by using a number of processes which does not exceed the number of factors in limited supply, if this number is greater than zero. The conclusions we drew from Figures 6 and 7 both conform to this rule, and it is one of the basic theorems of mathematical programming.

Second: although at most two processes are required to obtain the maximum output, which two depends on the location of the factor limits. As shown, the processes used for maximum output were Proces-

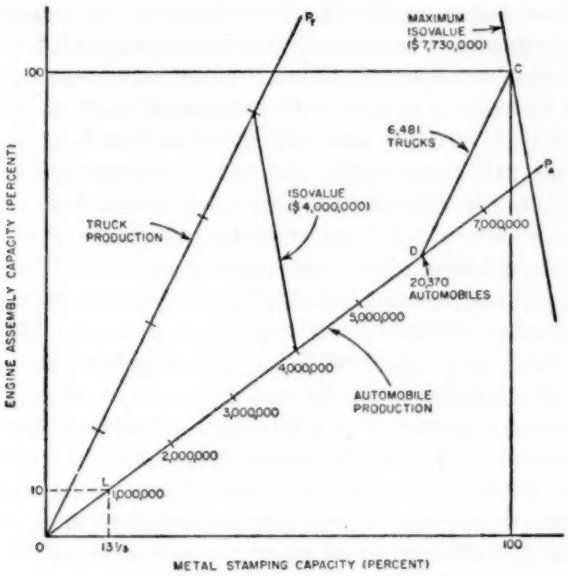

FIGURE 8. AUTOMOBILE EXAMPLE, OPTIMAL PLAN

ses A and B. If somewhat more capital, represented by the amount OF', were available, the maximizing processes would have been Processes C and D. If two factors are limited, it is the ratio between their supplies rather than the absolute supplies of either which determines the processes in the optimum program. This contrasts with the case in which only one factor is limited. Just as the considerations which determine the optimum set of processes are more complicated when two factors are limited than when only one is, so with three or more limited factors the optimum conditions become more complicated still and soon pass the reach of intuition. This, indeed, is the *raison d'être* of the formidable apparatus of mathematical programming.

We can make these considerations more concrete by applying them to the automobile example. Referring to Figure 1, (p. 799), we note that the optimum production point, C, lay on the limitation lines for engine assembly and metal stamping, but well below the limits for automobile and truck assembly. The limitations on automobile and truck assembly capacity are, therefore, ineffective and can be disregarded. The situation in terms of the two effectively limiting types of capacity is shown in Figure 8.

In Figure 8 the ray P_A represents the process of producing automobiles and P_T the process of producing trucks. These two processes can be operated at any combination of levels which does not require the use of more than 100 per cent of either metal stamping or engine assembly

capacity. Thus the rectangle in the diagram is the region of feasible production programs. The optimal production program is the one in the feasible region which corresponds to the highest possible net revenue.[10] Thus it will be helpful to construct isorevenue lines, as we did in Figure 7. To do this, consider automobile production first. Each point on P_A corresponds to the production of a certain number of automobiles per month. Suppose, for example, that the scale is such that point L represents the production of 3,333 automobiles per month. It will be recalled that each automobile yields a net revenue of $300. Therefore, 3,333 automobiles yield a revenue of $1,000,000. Point L, then, corresponds to a net revenue of $1,000,000 as well as to an output of 3,333 automobiles per month. Since (see page 799), 3,333 automobiles require 13⅓ per cent of metal stamping capacity and 10 per cent of engine assembly capacity, the coordinates of the $1,000,000 net revenue point on P_A are established at once. By a similar argument, the point whose coordinates are 26⅔ per cent of metal stamping capacity and 20 per cent of engine capacity is the $2,000,000 net revenue point on P_A. In the same manner, the whole ray can be drawn and scaled off in terms of net revenue, and so can P_T, the process ray for truck production. The diagram is completed by connecting the $4,000,000 points on the two process lines in order to show the direction of the isorevenue lines.

The optimum program is at point C, where the two capacity limits intersect, because C lies on the highest isorevenue line which touches the feasible region. Through point C we have drawn a line parallel to the truck production line and meeting the automobile production line at D. By our previous argument, the length OD represents the net revenue from automobile production in the optimal program and the length DC represents the net revenue from trucks. If these lengths be scaled off, the result, of course, will be the same as the solution found previously.

V. *Imputation of Factor Values*

We have just noted that the major field of application of mathematical programming is to problems where the supply of one or more factors of production is absolutely limited. Such scarcities are the genesis of value in ordinary analysis, and they generate values in mathematical programming too. In fact, in ordinary analysis the determination of outputs and the determination of prices are but two aspects of the same problem, the optimal allocation of scarce resources. The same is true in mathematical programming.

[10] Since the objective of the firm is, by assumption, to maximize revenue rather than physical output, we may consider automobile and truck production as two alternative processes for producing revenue instead of as two processes with disparate outputs.

Heretofore we have encountered prices only as data for determining the direct costs of processes and the net value of output. But of course the limiting factors of production also have value although we have not assigned prices to them up to now. In this section we shall see that the solution of a mathematical programming problem implicitly assigns values to the limiting factors of production. Furthermore, the implicit pricing problem can be solved directly and, when so solved, constitutes a solution to the optimal allocation problem.

Consider the automobile example and ask: how much is a unit (1 per cent) of each of the types of capacity worth to the firm? The approach to this question is similar in spirit to the familiar marginal analysis. With respect to each type of capacity we calculate how much the maximum revenue would increase if one more unit were added, or how much revenue would decrease if one unit were taken away. Since there is a surplus of automobile assembly capacity, neither the addition nor the subtraction of one unit of this type would affect the optimum program or the maximum net revenue. Hence the value of this type of capacity is nil. The analysis and result for truck assembly are the same.

We find, then, that these two types of capacity are free goods. This does not imply that an automobile assembly line is not worth having, any more than, to take a classic example, the fact that air is a free good means that it can be dispensed with. It means that it would not be worth while to increase this type of capacity at any positive price and that some units of these types could be disposed of without loss.

The valuation of the other types of capacity is not so trivial. In Figure 9 possible values per per cent of engine assembly capacity are scaled along the horizontal axis and values per per cent of metal stamping capacity are scaled along the vertical axis. Now consider any possible pair of values, say engine assembly capacity worth \$20,000 per unit and metal stamping worth \$40,000. This is represented by point A on the figure. Applying these values to the data on pages 798-99, the values of capacity required for producing an automobile is found to be: $(0.004 \times \$40{,}000) + (0.003 \times \$20{,}000) = \$220$ which is well under the value of producing an automobile, or \$300.[11] In the same way, if engine assembly capacity is worth \$60,000 per per cent of capacity and metal stamping capacity is valued at \$30,000 per unit (point B), the cost of scarce resources required to produce an automobile will be exactly equal to the value of the product. This is clearly not the only combination of resource values which will precisely absorb the value of output when the resources are used to produce automobiles. The automobile production line in the figure, which passes through point B, is

[11] These unit values are also marginal values since costs of production are constant.

the locus of all such value combinations. A similar line has been drawn for truck production to represent those combinations of resource values for which the total value of resources used in producing trucks is equal to the value of output. The intersection of these two lines is obviously the only pair of resource values for which the marginal resource cost of producing an additional automobile is equal to the net value of an automobile and the same is true with respect to trucks. The pair can be found by plotting or, with more precision, by algebra. It is found that 1 per cent of engine assembly capacity is worth \$9,259 and 1 per cent of metal stamping capacity is worth \$68,056.

To each pair of values for the two types of capacity, there corresponds a value for the entire plant. Thus to the pair of values represented by point A there corresponds the plant value of $(100 \times \$20{,}000) + (100 \times \$40{,}000) = \$6{,}000{,}000$. This is not the only pair of resource values which give an aggregate plant value of \$6,000,000. Indeed, any pair of resource values on the dotted line through A corresponds to the same aggregate plant value. (By this stage, Figure 9 should become strongly reminiscent of Figure 1, page 799.) We have drawn a number of dotted lines parallel to the one just described, each corresponding to a specific aggregate plant value. The dotted line which passes through the intersection of the two production lines is of particular interest. By measurement or otherwise this line can be found to correspond to a plant value of \$7,731,500 which, we recall, was found to be the maximum attainable net revenue.

Let us consider the implications of assigning values to the two limiting factors from a slightly different angle. We have seen that as soon as unit values have been assigned to the factors an aggregate value is assigned to the plant. We can make the aggregate plant value as low as we please, simply by assigning sufficiently low values to the various factors. But if the values assigned are too low, we have the unsatisfactory consequence that some of the processes will give rise to unimputed surpluses. We may, therefore, seek the lowest aggregate plant value which can be assigned and still have no process yield an unimputed surplus. In the automobile case, that value is \$7,731,500. In the course of finding the lowest acceptable plant value we find specific unit values to be assigned to each of the resources.

In this example there are two processes and four limited resources. It turns out that only two of the resources were effectivly limiting, the others being in relatively ample supply. In general, the characteristics of the solution to a programming problem depend on the relationship between the number of limited resources and the number of processes taken into consideration. If, as in the present instance, the number of limited resources exceeds the number of processes it will usually turn

out that some of the resources will have imputed values of zero and that the number of resources with positive imputed values will be equal to the number of processes.[12] If the number of limited resources equals the number of processes all resources will have positive imputed values. If, finally, the number of processes exceeds the number of limited resources, some of the processes will not be used in the optimal program. This situation, which is the usual one, was illustrated in Figure 6. In this case the total imputed value of resources absorbed will equal net revenue for some processes and will exceed it for others. The number of

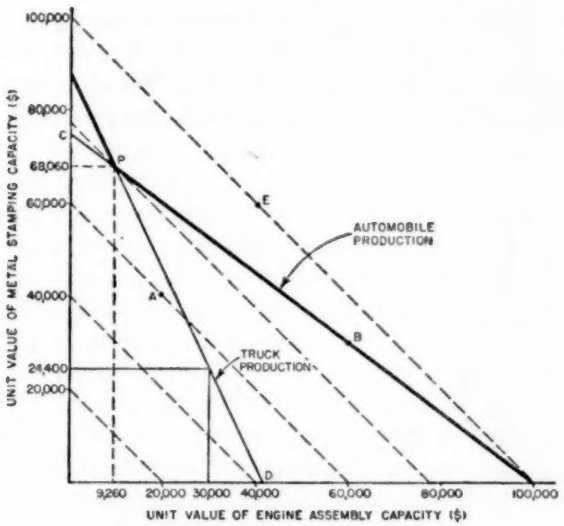

FIGURE 9. AUTOMOBILE EXAMPLE, IMPLICIT VALUES

processes for which the imputed value of resources absorbed equals the net revenue will be just equal to the number of limited resources and the processes for which the equality holds are the ones which will appear at positive levels in the optimal program. In brief, the determination of the minimum acceptable plant value amounts to the same thing as the determination of the optimal production program. The programming problem and the valuation problem are not only closely related, they are basically the same.

This can be seen graphically by comparing Figures 1 and 9. Each figure contains two axes and two diagonal boundary lines. But the boundary lines in Figure 9 refer to the same processes as the axes in Figure 1, and the axes in Figure 9 refer to the same resources as the

[12] We say "usually" in this sentence because in some special circumstances the number of resources with positive imputed values may exceed the number of processes.

diagonal boundary lines in Figure 1. Furthermore, in using Figure 1 we sought the net revenue corresponding to the highest dashed line touched by the boundary; in using Figure 9 we sought the aggregate value corresponding to the lowest dashed line which has any points on or outside the boundary; and the two results turned out to be the same. Formally stated, these two figures and the problems they represent are *duals* of each other.

The dualism feature is a very useful property in the solution of mathematical programming problems. The simplest way to see this is to note that when confronting a mathematical programming problem we have the choice of solving the problem or its dual, whichever is easier. Either way we can get the same results. We can use this feature now to generalize our discussion somewhat. Up to now when dealing with more than two processes we have had to use relatively complicated

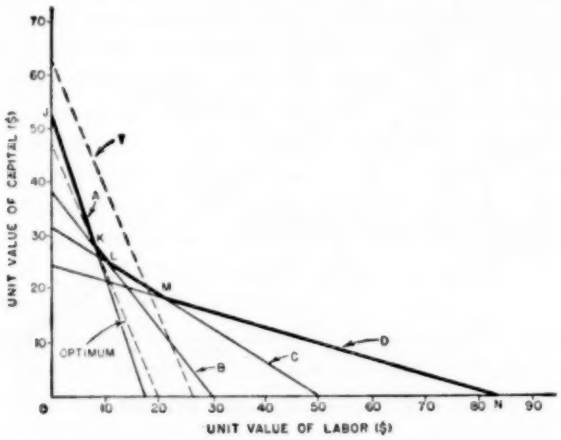

FIGURE 10. THE VALUATION PROBLEM, FOUR PROCESSES

diagrams like Figure 6 because straightforward diagrams like Figure 1 did not contain enough axes to represent the levels of the processes. Now we can use diagrams modeled on Figure 9 to depict problems with any number of processes so long as they do not involve more than two scarce factors. Figure 10 illustrates a diagram for four processes and is, indeed, derived from Figure 6. In Figure 10 line A represents all pairs of factor values such that Process A would yield neither a profit nor a loss. Lines B, C, and D are similarly interpreted. The dashed line T is a locus along which the aggregate value of the labor and capital available to the firm (or industry) is constant. Its position is not relevant to the analysis; its slope, which is simply the ratio of the quantity of available labor to that of capital, is all that is significant. The broken

line JKLMN divides the graph into two regions. All points on or above it represent pairs of resource values such that no process gives rise to an unimputed surplus. Let us call this the acceptable region. For each point below that broken line there is at least one process which does have an unimputed surplus. This is the unacceptable region. We then seek for that point in the acceptable region which corresponds to the lowest aggregate plant value. This point will, of course, give the set of resource values which makes the accounting profit of the firm as great as possible without giving rise to any unimputed income. The point which meets these requirements is K, and a dotted line parallel to T has been drawn through it to indicate the minimum acceptable aggregate plant value.

At point K Processes A and B yield zero profits, and Processes C and D yield losses. Hence Processes A and B are the ones which should be used, exactly as we found in Figure 6. To be sure, this diagram does not tell the levels at which A and B should be used, any more than Figure 6 tells the valuations to be placed on the two resources. But finding the levels after the processes have been selected is a comparatively trivial matter. All that is necessary is to find the levels which will fully utilize the resources which are not free goods. This may be done algebraically or by means of a diagram like Figure 8.

VI. *Applications*

In the first section we asserted that the principal motivation of mathematical programming was the need for a method of analysis which lent itself to the practical solution of the day-to-day problems of business and the economy in general. Immediately after making that claim we introduced a highly artificial problem followed by a rather extended discussion of abstract and formal relationships. The time has now come to indicate the basis for saying that mathematical programming is a practical method of analysis.

The essential simplification achieved in mathematical programming is the replacement of the notion of the production function by the notion of the process. The process is a highly observable unit of activity and the empirical constants which characterize it can be estimated without elaborate analysis. Furthermore in many industries the structure of production corresponds to operating a succession of processes, as we have conceived them. Many industrial decisions, like shutting down a bank of machines or operating an extra shift, correspond naturally to our concept of choosing the level of operation of a process. In brief, mathematical programming is modelled after the actual structure of production in the hope that thereby it will involve only observable

constants and directly controllable variables.

Has this hope been justified? The literature already contains a report of a successful application to petroleum refining.[13] I have made a similar application which, perhaps, will bear description. The application was to a moderate-sized refinery which produces premium and regular grades of automotive gasoline. The essential operation studied was blending. In blending, ten chemically distinct kinds of semirefined oil, called blending stocks, are mixed together. The result is a saleable gasoline whose characteristics are approximately the weighted average of the characteristics of the blending stocks. For example, if 500 gallons of a stock with octane rating of 80 are blended with 1,000 gallons of a stock with octane rating of 86 the result will be $500 + 1{,}000 = 1{,}500$ gallons of product with octane rating of $(\frac{1}{3} \times 80) + (\frac{2}{3} \times 86) = 84$.

The significant aspect of gasoline blending for our present purposes is that the major characteristics of the blend—its knock rating, its vapor pressure, its sulphur content, etc.—can be expressed as linear functions of the quantities of the various blending stocks used. So also can the cost of the blend if each of the blending stocks has a definite price per gallon. Thus the problem of finding the minimum cost blend which will meet given quality specifications is a problem in mathematical programming.

Furthermore, in this refinery the quantities of some of the blending stocks are definitely limited by contracts and by refining capacity. The problem then arises: what are the most profitable quantities of output of regular and premium gasoline, and how much of each blending stock should be used for each final product. This problem is analogous to the artificial automobile example, with the added complication of the quality specifications. The problem is too complicated for graphic analysis but was solved easily by arithmetical procedures. As far as is known, mathematical programming provides the only way for solving such problems. Charnes and Cooper have recently published the solution to a similar problem which arose in the operations of a metal-working firm.[14]

An entirely different kind of problem, also amenable to mathematical programming, arises in newsprint production. Freight is a major element in the cost of newsprint. One large newsprint company has six mills, widely scattered in Canada, and some two hundred customers, widely scattered in the United States. Its problem is to decide how much

[13] A. Charnes, W. W. Cooper and B. Mellon, "Blending Aviation Gasolines," *Econometrica* Apr. 1952, XX, 135-59.

[14] A. Charnes, W. W. Cooper, and Donald Farr and Staff, "Linear Programming and Profit Preference Scheduling for a Manufacturing Firm," *Jour. Operations Research Society of America*, May 1953, I, 114-29.

newsprint to ship from each mill to each customer so as, first, to meet the contract requirements of each customer, second, to stay within the capacity limits of each mill, and third, to keep the aggregate freight bill as small as possible. This problem involves 1,200 variables (6 mills $\times$ 200 customers), in contrast to the two or four variable problems we have been discussing. In the final solution most of these variables will turn out to be zero—the question is which ones. This problem is solved by mathematical programming and, though formidable, is not really as formidable as the count of variables might indicate.

These few illustrations should suffice to indicate that mathematical programming is a practical tool for business planning. They show, also, that it is a flexible tool because both examples deviated from the format of the example used in our exposition. The petroleum application had the added feature of quality specification. In the newsprint application there were limits on the quantity of output as well as on the quantities of the inputs. Nevertheless mathematical programming handled them both easily.

On the other hand, it should be noted that both of these were small-scale applications, dealing with a single phase of the operation of a single firm. I believe that this has been true of all successful applications to date. Mathematical programmers are still a long way from solving the broad planning problem of entire industries or an entire economy. But many such broad problems are only enlarged versions of problems which have been met and solved in the context of the single firm. It is no longer premature to say that mathematical programming has proved its worth as a practical tool for finding optimal economic programs.

VII. *Conclusion*

Our objective has been only to introduce the basic notions of mathematical programming and to invest them with plausibility and meaning. The reader who would learn to solve a programming problem—even the simplest—will have to look elsewhere,[15] though this paper may serve as a useful background.

Although methods of solution have been omitted from this exposition, we must emphasize that these methods are fundamental to the whole concept of mathematical programming. Some eighty years ago Walras conceived of production in very much the same manner as mathematical

[15] The standard reference is T. C. Koopmans, ed., *Activity Analysis of Production and Allocation* (New York, 1951). Less advanced treatments may be found in A. Charnes, W. W. Cooper, and A. Henderson, *An Introduction to Linear Programming* (New York, 1953); and my own *Application of Linear Programming to the Theory of the Firm* (Berkeley, 1951).

programmers, and more recently A. Wald and J. von Neumann used this view of production and methods closely allied to those of mathematical programming to analyze the conditions of general economic equilibrium.[16] These developments, however, must be regarded merely as precursors of mathematical programming. Programming had no independent existence as a mode of economic analysis until 1947 when G. B. Dantzig announced the "simplex method" of solution which made practical application feasible.[17] The existence of a method whereby economic optima could be explicitly calculated stimulated research into the economic interpretation of mathematical programming and led also to the development of alternative methods of solution. The fact that economic and business problems when formulated in terms of mathematical programming can be solved numerically is the basis of the importance of the method. The omission of methods of solution from this discussion should not, therefore, be taken to indicate that they are of secondary interest.

We have considered only a few of the concepts used in mathematical programming and have dealt with only a single type of programming problem. The few notions we have considered, however, are the basic ones; all the rest of mathematical programming is elaboration and extension of them. It seems advisable to mention two directions of elaboration, for they remove or weaken two of the most restrictive assumptions which have here been imposed.

The first of these extensions is the introduction of time into the analysis. The present treatment has dealt with a single production period in isolation. But in many cases, successive production periods are interrelated. This is so, for example, in the case of a vertically integrated firm where the operation of some processes in one period is limited by the levels of operation in the preceding period of the processes which supply their raw materials. Efficient methods for analyzing such "dynamic" problems are being investigated, particularly by George Dantzig.[18] Although the present discussion has been static, the method of analysis can be applied to problems with a time dimension.

[16] Walras' formulation is in *Éléments d'économie politique pure ou théorie de la richesse sociale*, 2d ed. (Lausanne, 1889), 20e Leçon. The contributions of A. Wald and J. von Neumann appeared originally in *Ergebnisse eines mathematischen Kolloquiums*, Nos. 6, 7, 8. Wald's least technical paper appeared in *Zeitschrift für Nationalökonomie*, VII (1936) and has been translated as "On some Systems of Equations of Mathematical Economics," *Econometrica*, Oct. 1951, XIX, 368-403. Von Neumann's basic paper appeared in translation as "A Model of General Economic Equilibrium," *Rev. Econ. Stud.*, 1945-46, XIII, 1-9.

[17] G. B. Dantzig, "Maximization of a Linear Function of Variables Subject to Linear Inequalities," T. C. Koopmans, ed., *op. cit.*, pp. 339-47.

[18] "A Note on a Dynamic Leontief Model with Substitution" (abstract), *Econometrica*, Jan. 1953, XXI, 179.

The second of these extensions is the allowance for changes in the prices of factors and final products. In our discussion we regarded all prices as unalterable and independent of the actions of the economic unit under consideration. Constant prices are, undeniably, a great convenience to the analyst, but the method can transcend this assumption when necessary. The general mathematical theory of dealing with variable prices has been investigated[19] and practical methods of solution have been developed for problems where the demand and supply curves are linear.[20] The assumption of constant prices, perhaps the most restrictive assumption we have made, is adopted for convenience rather than from necessity.

Mathematical programming has been developed as a tool for economic and business planning and not primarily for the descriptive, and therefore predictive, purposes which gave rise to the marginal analysis. Nevertheless it does have predictive implications. In so far as firms operate under the conditions assumed in mathematical programming it would be unreasonable to assume that they acted as if they operated under the conditions assumed by the marginal analysis. Consider, for example, the automobile firm portrayed in Figure 1. How would it respond if the price of automobiles were to fall, say by $50 a unit? In that case the net revenue per automobile would be $250, the same as the net revenue per truck. Diagrammatically, the result would be to rotate the lines of equal revenue until their slope was 45 degrees. After this rotation, point C would still be optimum and this change in prices would cause no change in optimum output. Mathematical programming gives rise, thus, to a kinked supply curve.

On the other hand, suppose that the price of automobiles were to rise by $50. Diagrammatically this price change would decrease the steepness of the equal revenue lines until they were just parallel to the metal stamping line. The firm would then be in a position like that illustrated by the YY′ line in Figure 5. The production plans corresponding to points on the line segment DC in Figure 1 would all yield the same net revenue and all would be optimal. If the prices of automobiles were to rise by more than $50 or if a $50 increase in the price of automobiles were accompanied by any decrease in the price of trucks, the point of optimal production would jump abruptly from point C to point D.

Thus mathematical programming indicates that firms whose choices

[19] See H. W. Kuhn and A. W. Tucker, "Non-Linear Programming," in J. Neyman, ed., *Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability* (Berkeley, 1951), pp. 481-92.

[20] I reported one solution of this problem to a seminar at the Massachusetts Institute of Technology in September 1952. Other solutions may be known.

are limited to distinct processes will respond discontinuously to price variations: they will be insensitive to price changes over a certain range and will change their levels of output sharply as soon as that range is passed. This theoretical deduction surely has real counterparts.

The relationship between mathematical programming and welfare economics is especially close. Welfare economics studies the optimal organization of economic effort; so does mathematical programming. This relationship has been investigated especially by Koopmans and Samuelson.[21] The finding, generally stated, is that the equilibrium position of a perfectly competitive economy is the same as the optimal solution to the mathematical programming problem embodying the same data.

Mathematical programming is closely allied mathematically to the methods of input-output analysis or interindustry analysis developed largely by W. W. Leontief.[22] The two methods were developed independently, however, and it is important to distinguish them conceptually. Input-output analysis finds its application almost exclusively in the study of general economic equilibrium. It conceives of an economy as divided into a number of industrial sectors each of which is analogous to a process as the term is used in mathematical programming. It then takes either of two forms. In "open models" an input-output analysis starts with some specified final demand for the products of each of the sectors and calculates the level at which each of the sector-processes must operate in order to meet this schedule of final demands. In "closed models" final demand does not appear but attention is concentrated on the fact that the inputs required by each sector-process must be supplied as outputs by some other sector-processes. Input-output analysis then calculates a mutually compatible set of output levels for the various sectors. By contrast with mathematical programming the conditions imposed in input-output analysis are sufficient to determine the levels of the processes and there is no scope for finding an optimal solution or a set of "best" levels. To be sure, input-output analysis can be regarded as a special case of mathematical programming in which the number of products is equal to the number of processes. On the other hand, the limitations on the supplies of resources which play so important a rôle in mathematical programming are not dealt with explicitly in input-output analysis. On the whole it seems

[21] T. C. Koopmans, "Analysis of Production as an Efficient Combination of Activities," in T. C. Koopmans, ed., *op. cit.*, pp. 33-97; P. A. Samuelson, "Market Mechanisms and Maximization" (a paper prepared for the Rand Corp., 1949).

[22] W. W. Leontief, *The Structure of American Economy 1919-1939*, 2nd. ed. (New York, 1951).

best to regard these two techniques as allied but distinct methods of analysis addressed to different problems.

Mathematical programming, then, is of significance for economic thinking and theory as well as for business and economic planning. We have been able only to allude to this significance. Indeed, apart from the exploration of welfare implications, very little thought has been given to the consequences for economics of mathematical programming because most effort has been devoted to solving the numerous practical problems to which it gives rise. The outlook is for fruitful researches into both the implications and applications of mathematical programming.

VERTICAL EQUILIBRIUM UNDER PURE QUALITY COMPETITION

By LAWRENCE ABBOTT*

The customary approach to equilibrium analysis is through the construction of a "pure" model consisting of a simplified market situation in which competing sellers offer products whose quality is uniform and unchanging, so that equilibrating adjustments are restricted to changes in price and output. The usefulness of such a model lies in the fact that, by ruling out both quality variability and imperfect substitution, the analyst is able to abstract completely from the quality element in exchange, and can therefore obtain the clearest possible picture of the price variable.

This so-called "purely competitive" situation, however, is not the only pure type of competitive market. Another "pure" and "competitive" model precisely the reverse of the one just described may be set up, in which the *price* of all competing goods in the market is uniform and unchanging, while quality is freely variable, so that adjustments are restricted to changes in product quality—with, of course, corresponding changes in output. To distinguish such a situation from its more familiar counterpart, we shall find it convenient to label it *pure quality competition*. The term *pure price competition* can then be used to describe the opposite ("purely competitive") situation, in which the price variable operates in isolation.

This second "pure" model is, of course, neither new nor unfamiliar. Chamberlin's path-breaking analysis of "product equilibrium" in *The Theory of Monopolistic Competition* employed this very model. But despite the highly suggestive character of that analysis, the study of quality competition as an equilibrating process has remained a neglected area of economic theory.[1]

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[1] Analyses of spatial competition by Hotelling, Smithies and others have thrown some light on the subject, but are restricted to only one aspect of quality competition. A recent analysis of product competition in the broadcasting industry by Peter O. Steiner, employing a different technique in dealing with the same general problem, offers interesting possibilities for analysis of quality competition; yet Steiner's model likewise treats quality variability in only a limited way, since variation is confined to choice between "types" of radio programs (quiz show, comedy program, etc.), within each of which quality variation is implicitly assumed to be nil or of no effect on listener preference ("Program Patterns

Yet the limiting case of "pure quality competition" is surely of great importance. Markets which approximate it—characterized by price rigidity or stickiness and by products which are not fixed in quality—form a substantial fraction of today's economy. Analysis of "pure quality competition" is also important because it provides an analytical device of great usefulness in the study of free markets in general. By stilling the movements of price, we are enabled to observe with greater clarity the kinds of behavior and adjustment *other than price and output changes* which are found in markets where both products and prices are free to vary. These kinds of behavior are especially significant in the many markets in which prices, although not completely rigid, move sluggishly.

This paper is an attempt to provide a theoretical framework in which this important but neglected aspect of competition can be usefully studied. Its specific objective is to determine the conditions of equilibrium with respect to one aspect of quality only in a hypothetical single-fixed-price market in which quality is freely variable. Its scope is therefore severely limited. Nevertheless, it is hoped that the analysis will throw some light on the kinds of behavior and market structures that quality competition tends to produce, and may pave the way for the construction of more comprehensive theoretical models.

I. *Definitions of Terms*

The word *quality* will be used in its broadest sense, to describe any or all of the various qualitative characteristics of a physical product or service, or combination of the two, offered for sale. "Quality" thus includes materials, design, style, location of a retail outlet—in short, any and every qualitative attribute. Quality is therefore a multidimensional variable—a compound of numerous elements (*e.g.*, in a necktie: size, shape, type of construction, pattern, color scheme, material, texture, durability, resistance to wrinkling, color fastness), each of which is variable.

Quality competition will refer to producers' independent actions regarding the quality of their respective products, prompted by the desire to improve their positions, when such products are variable in quality and are offered in the same market.

The *market* is defined as embracing those products which are com-

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and Preferences, and the Workability of Competition in Radio Broadcasting," *Quart. Jour. Econ.*, May 1952, LXVI, 194-223). Another recent theoretical study of greater comprehensiveness is Hans Brems' *Product Equilibrium under Monopolistic Competition* (Cambridge, 1951), but this work contains no thoroughgoing analysis of the equilibrium positions of firms in markets where quality alone is variable.

petitive in the sense of being substitutable alternatives, each capable of serving some given purpose, or, let us say, performing some given function, or rendering some given service, or enabling its possessor to engage in some given activity. In other words, products will be considered to belong within the same market or industry if they can be regarded as variable means to some definable common end.[2]

For our purposes it will be convenient to distinguish three kinds of quality variability:

1. *Vertical*—the kind of quality change or comparison which may properly be described in terms of "higher" or "lower." Two things distinguish this kind: (a) the "superior" of any two qualities is considered preferable by virtually all buyers, and (b) it entails greater cost. Therefore an upward (or downward) vertical change in quality unaccompanied by a change in price gives the buyer more (or less) for his money than before.

Vertical differences in quality frequently consist of differences in the quantity of some desired ingredient or attribute: the metallic content of an ore, the tensile strength of steel wire, the mileage in an automobile tire. The simplest kind of vertical variation is a change in the size of the unit. With vertical differences it is appropriate to speak of one quality being "better" or of higher "grade" than another, of "cheap" versus "good" quality, and of "improvement" or "deterioration" of quality.

2. *Horizontal*—those differences about which there is no clear-cut agreement. Two things distinguish this type: (a) different people will rank dissimilar qualities in different orders, and (b) cost differences, if any, are purely incidental. The existence of this category depends on the fact that people differ in their circumstances, values, and tastes. With differences of this sort we may properly speak of one quality being "more suitable" or "more appealing" than another, but such a statement is meaningful only if made with reference to a particular buyer or group of buyers. The most obvious examples of horizontal differences are those that involve aesthetic considerations: color, texture, shape, styling. Unlike vertical quality, horizontal quality is of a sort that can become excessive (*e.g.*, the stiffness of the springs of a mat-

[2] While this may not be a wholly rigorous definition of a market's boundaries, it seems acceptable enough for our purposes, especially if employed with an admixture of common sense. We may think of the toilet soap market, for example, as including only those products which can be used in a bathroom to cleanse the skin. Similarly, the furnace or space-heating-equipment market is limited to those products which keep buildings warm in winter. Ruby T. Norris presents this concept of an industry in *The Theory of Consumer's Demand* (New Haven, 1941), pp. 78-79. See also James S. Duesenberry, *Income, Saving, and the Theory of Consumer Behavior* (Cambridge, Mass., 1949), p. 20.

tress, or the hardness of a soft-boiled egg). Horizontal differences are, as a rule, nonmeasurable.[3]

3. *Innovational*—the introduction of a novel quality which is judged superior by most or all buyers, and which either costs no more to produce or is well worth whatever additional cost is involved, so that the older quality must eventually become obsolete. This kind of quality change, associated with innovation and progress, leads to "improved" rather than "higher" quality. A new idea having universal or near-universal appeal (*e.g.*, the three-passenger front seat) or a technical improvement in design (*e.g.*, steel-shafted golf clubs) lie in this category. Here the superiority is not due to better materials or workmanship, nor does the change alter the grade or price class to which a product belongs, but rather creates quality differences and improvement within each grade. Innovational change in quality, if considered an improvement, eventually makes obsolete the previously accepted quality, whereas differences in vertical quality, being accompanied by cost and price differences, show no tendency to be eliminated.

Actual quality changes do not always fit neatly into one or another of these three categories. A change may be a hybrid, such as innovational-horizontal, or may contain elements of all three, or may be innovational with respect to some horizontal qualities but not with respect to others. The above classification is simply an analytical device, imperfect yet highly useful for detailed analysis of quality competition.

II. *The Principal Assumptions*

In analyzing quality equilibrium, simplifying assumptions are of course needed. Moreover, it seems desirable to reduce the complexity of our task by restricting our scrutiny for the present to one aspect of quality variation. In the model here developed three important simplifications will be made:

(1) Innovational variation will be ruled out. Although this exclusion is made with some reluctance, since quality adjustments in the real

[3] The fact that some qualities are neither "better" nor "worse" than others, but merely better suited to some people's wants (and less suited to others') seems so self-evident that the statement presented above may be deemed superfluous. Yet the idea needs emphasizing since economists have so frequently written as if all significant quality differences were of the vertical type. See for example Marshall, *Principles of Economics*, 8th ed. (London, 1920), pp. 100, 113; Stephen Enke, "Profit Maximization under Monopolistic Competition," *Am. Econ. Rev.*, June 1941, XXXI, p. 322; M. W. Reder, *Studies in the Theory of Welfare Economics* (New York, 1947), p. 74.

The related idea that quality differences always involve cost differences has also been expressed from time to time. See E. H. Chamberlin, *The Theory of Monopolistic Competition*, 5th ed. (Cambridge, Mass., 1946), p. 96; Joan Robinson, *The Economics of Imperfect Competition* (London, 1933), p. 90 n.

world are to a large extent innovational in character, to attempt to incorporate innovational changes in a model concerned with quality equilibrium would raise enormous analytical difficulties. Human ingenuity is capable of devising countless variations of products. Progress in science and technology opens up ever new opportunities for further variation. Even in an economy in which people's wants remain constant, the number of moves and countermoves needed for the achievement of quality equilibrium would seem to be indefinitely great. To make our analysis manageable, we must impose conditions under which equilibrium is conceptually attainable within a reasonably short period.

The assumption that no innovational variation in quality occurs does not rule out all pioneer quality changes; two sorts remain possible. A new quality may be selected "in between" the qualities of two variants already in existence. (If bicycles of 24-inch and 26-inch wheels are already being produced, producers are free to offer a 25-inch bicycle.) And in the typical case in which a product's quality is compounded of numerous variable elements, existing quality elements may be put together in new combinations.[4]

(2) Since it seems advisable for the sake of brevity to confine this essay in model-building to one kind of quality adjustment, the consequences of *horizontal* variability will be assumed rather than deduced from other assumptions.[5] Accordingly, the model constructed below will show only the equilibrating *vertical* quality adjustments made in a one-fixed-price market. The following set of assumptions about horizontal quality differences and adjustments will be made: (a) Each firm's product differs horizontally from every other and attracts its own group of buyers. (b) Buyers' preferences and producers' choices of horizontal quality are such that, in the absence of vertical quality differences, the demand for every variety is the same, and therefore all firms have equal outputs. (c) When firms enter or leave the industry, horizontal quality adjustments take place in such a way that the above condition continues to hold.

(3) Vertical variability will be restricted to a single dimension, and conceived to be of such a character that the possible varieties can be arranged in order, in an "array" or "spectrum." More specifically, it will be assumed that vertical quality is variable in only one respect, is continuously variable, and is such that for every level of quality there is

[4] See Norris, *op. cit.*, p. 187: "In most commodity clusters, by taking thought one can perceive numerous rearrangements of existing qualitative differences, which are not offered."

[5] In a more comprehensive study of pure quality competition it would certainly be desirable to deduce the step-by-step process of horizontal adaptation and the position of horizontal equilibrium under various hypothetical conditions, in order that firms' behavior with regard to horizontal variability be explained rather than merely assumed.

a different, and only one, corresponding cost function.

This restriction enables us to depict quality levels graphically by drawing their corresponding cost curves. In reality, of course, product quality is likely to consist of numerous variable components, both horizontal and vertical; in fact, it is the multidimensional character of quality that makes choice between quality alternatives so much more difficult than choice between price alternatives. But when a product is vertically variable in several respects, the level of quality is conceivable only as some kind of average of the levels of the various vertical quality components, and the relationship between cost and vertical quality is obscure. The above simplification removes this difficulty.

Assumptions are also needed with regard to the way in which vertical quality variation affects demand. Two situations must be distinguished: one, in which vertical quality changes are made by all firms in unison; and the other, in which one firm raises or lowers quality while the rest of the firms leave quality unaltered.

Let us consider first market demand as a function of quality height when vertical quality changes are made simultaneously by all firms. Unless demand is totally inelastic, a rise in vertical quality in a fixed-price market—like a fall in price in a fixed-quality market—will affect the amount demanded to some degree. Buyers will purchase more. Yet the statement just made is ambiguous; does it mean that they will buy more units of the product? or merely that they will purchase enough to bring them more satisfaction? This question does not arise in the theory of price, since when products remain unchanged in quality an increase in satisfaction can be obtained only by an increase in the number of units consumed. But when quality is vertically variable, this is no longer true.

Suppose a situation in which mining companies are supplying ore to a copper-refining firm, and now offer a higher-grade ore at the same price. Will the refining firm increase its purchases? If the demand for refined copper is not totally inelastic, the firm will certainly buy a large enough quantity to give it a greater volume of refined copper, but it is altogether possible that a smaller volume of the superior ore will yield the increased volume of copper desired, in which case the firm's purchases of ore will actually be reduced. A similar pattern of response is possible in cases where the desired ingredient is not a physical substance like copper, but a psychic quantity or a measurable service, such as mileage in an automobile tire. In all such cases it is necessary to distinguish between the *volume of satisfaction* desired by the buyer and the *number of units* desired.

To obtain the sharpest picture of buyers' response to a vertical

change in quality, let us consider the kind of vertical variation in which an upward change increases the amount of satisfaction obtainable from a product, in the opinion of all buyers, without there being any accompanying decrease in its satisfactoriness in some other respect. Ordinarily a cost-raising quality change involves both a quantitative element (the giving of "more" of something which is invariably preferred in larger rather than smaller amounts) and a qualitative element (the provision of some other quality or qualities which are preferred in some optimum amount, and can be deficient or excessive).[6] Thus it is ordinarily a mixture, an alloy. But the proportions of the amalgam are variable, and we can conceive of a limiting case in which only the quantitative element is present—when the change consists simply of an alteration of the size of the unit, all sizes being equally convenient or economical, or of the amount of some desired ingredient contained in it, buyers being wholly indifferent to any concomitant variation in the amounts of other ingredients present.

If we restrict our analysis to this "purest" kind of vertical variation, the pattern of response of consumers to vertical changes can be stated without difficulty. Clearly it must be exactly what their pattern of response would be to price changes in terms of a fixed unit. In any market demand schedule which embraces the gamut between the prohibitive price and the zero price, there is at least one point or range of output (and price or prices) at which the price elasticity of demand is unity; at smaller outputs (higher prices) the elasticity is greater than one, while at larger outputs (lower prices) it is less than one. Similarly, in a fixed-price market in which the unit is of variable size there must be some range of small sizes in which an increase in the unit's size causes a rise in physical volume demanded which is more than proportional to the increase—in other words, it causes a rise in the number of units demanded; beyond this there must be a size, or series or range of sizes, in which an increase raises the physical volume demanded proportionally, so that the number of units demanded remains unchanged; and beyond that must lie another range in which, though the physical volume rises further, the number of units demanded declines as the unit grows in size until finally, at the satiation point, the decline in units demanded is proportional to the increase in the unit's size.

We need not, however, include the entire gamut of demand in our analysis. Just as, in price analysis, profit-maximizing or money-revenue-

[6] Even changes in the size of the unit involve more than a simple quantitative change if the product is packaged. Imagine, for instance, tomato juice being made available to housewives in cans of various sizes ranging between one ounce and one ton, all selling at the same price (resale being prohibited). Surely the "best buy" would be some size smaller than the biggest.

maximizing firms would never be concerned with prices in that lower range in which the elasticity of demand is unity or less than unity, so, in vertical quality analysis, we can safely ignore the corresponding upper range of vertical quality, since cost-raising quality improvement would not be advantageous to firms in a fixed-price market unless it induced an increase in the number of units sold. In what follows, therefore, we need be concerned only with that range of outputs in which a rise in quality results in a rise in sales, and vice versa. We shall assume (4) that output demanded is an increasing function of the height of a product's quality, and that all buyers, no matter what their horizontal preferences are, behave similarly in response to a given degree of quality improvement.

If all firms should raise (or lower) quality in unison, there would be no reason to expect any firm to gain (or lose) more or less than its proportionate share of the total increase (or decrease) in market demand. On the other hand, if one firm should make its product vertically superior to rival products, it could be expected to attract buyers previously attached to those rival products—and vice versa. We may reasonably assume, therefore, that (5) when vertical quality changes are made "across the board" each firm continues to maintain its former share of the market; when one firm alters quality while others do not, its share of the market changes in the same direction.

This raises the question as to whether vertical quality differences would be allowed to persist in a one-price market. Though this is obviously a question of considerable theoretical interest, the temptation to explore it will be resisted. It will simply be assumed that (6) every change in vertical quality made by a firm will be matched, either immediately or eventually, by all other firms. (This could be true either because whenever one firm is prompted to alter quality vertically, others are similarly prompted for the same reason, or alternatively, because other firms feel forced to follow suit in order to retain their shares of the market.)

This assumption further narrows our field of inquiry. It may be defended on the ground that it is in keeping with the conclusion generally reached in monopolistic competition theory that when sellers of differentiated products have identical costs, every variety must sell at the same price in equilibrium.

A few other assumptions are needed to keep the analysis manageable: (7) Each firm offers only one variety of the product. (8) Decisions of rival firms in matters of quality are made independently. There is no collusion. (9) Buyers act rationally and respond promptly and correctly to every change in the quality alternatives made available to them. (This condition bars producers from being able to exploit consumer

ignorance, apathy, and gullibility.) (10) All horizontal qualities cost the same to produce. (11) At any given output rate, cost varies with quality height; and at any given quality height, cost varies with output, in such a way that all average cost curves are U-shaped. (12) Cost functions do not change; technology is constant.

III. *Short-Run Equilibrium*

We are now ready to build a theoretical model of a market conforming to our definition of pure quality competition, and to study the equilibrating vertical quality adjustments made and the position of vertical equilibrium reached under certain assumed conditions.

The assumptions stated above will be used without modification throughout the analysis. Three additional assumptions are made at the start, then later modified: (13a) Firms seek to maximize profits. (14a) Every change in vertical quality is immediately matched by all other firms, and each firm acts on the expectation that this will be so. (In other words, we are assuming here that the already-assumed "eventual" elimination of vertical differences occurs so quickly, and that this fact is so well recognized, that no firm considers it worth while to seek the temporary benefits of a newly created differential.) (15a) The number of firms is fixed at ten.[7]

Let costs—which are similar for every firm—be as shown in Figure 1. Each of the curves labeled AC depicts the average cost of producing a certain level of quality, designated by the subscript. Since vertical quality is continuously variable, the family of cost curves drawn represents only a few of the possible heights of quality.

Let OP represent the fixed price, and AC_6 the cost curve applicable to the vertical quality currently being offered. Let the market demand for this quality at this price be such that every firm's demanded output (one-tenth of the market demand) is OM. We thus start our analysis with each firm earning only normal profits—the position that would be attained if vertical quality were held fixed and the number of firms allowed to vary until excess profits or losses were eliminated. Let firms now be free to vary quality vertically. Our problem is: what variation will occur?

In order to investigate this question, we need further information about demand: namely, the change in quantity demanded associated with each change in the level of quality. This information can be assembled in the form of a schedule, and plotted as a curve; but it will

[7] Use of numbers rather than algebraic symbols to designate the number of sellers is solely for convenience in exposition, and is not to be regarded as diminishing the model's generality. If the reader prefers, n can be substituted for 10, $n + 1$ for 11, etc.

not be the familiar kind of demand curve showing quantity demanded as a function of price. Instead, it will show quantity demanded as a function of quality height, or, more precisely, of the cost uniquely associated with that height of quality at that rate of output.

Let us imagine the vertical quality to be varied while price is left unchanged, and note with respect to each quality height the output demanded, and also the unit cost of supplying that output. For each quality selected a point on our diagram can be found, the x distance of which represents the quantity demanded (the number of firms being what it is) and the y distance the unit cost of supplying that quantity. The locus of points so obtained is the desired curve.

This curve is sufficiently unconventional to warrant some further comments as to its character. It is, in a sense, a demand curve; for it

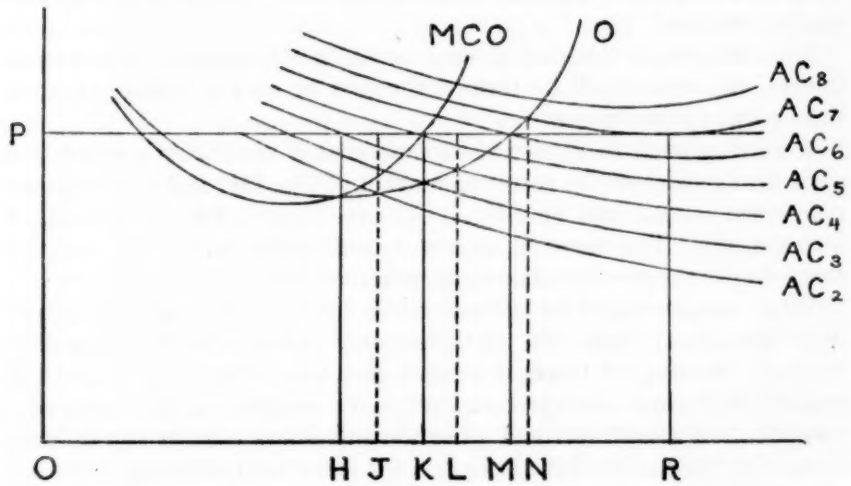

FIGURE 1

shows, for each height of quality selected (represented by the cost of supplying that quality), the quantity demanded. But it differs from the ordinary demand curve in that it does not give the demand *price* but rather the demand *cost* at each rate of output—that is the cost which the firm must incur in order to induce the purchase of that output, price being held at a predetermined level.

Its usefulness lies in the fact that it reveals the various options actually open to producers in a fixed-price market. In a "purely competitive" market the conventional average cost curve indicates genuine options. There each producer is at liberty to market as large or as small an output as he pleases; the cost curve and price line are useful in that together they reveal the consequences of each possible decision, and so

show which options are less desirable than others. But in a fixed-price market in which products differ horizontally in quality the conventional average cost curve does not contain options actually open to producers. All but one of the cost-output combinations on the curve are unattainable as long as the buyers' demand functions, the price, and the number of firms remain as they are. The producer is not free to unload on the market any output he chooses of a given level of quality; only if he varies vertical quality to the extent necessary to induce buyers to purchase the output he has in mind does that output become a genuine option. And then it is the cost of producing *that quality* which is the relevant cost in weighing the desirability of adjusting output to that rate. Hence the curve just described, relating demanded output to the cost of supplying that output, serves precisely the same purpose in a fixed-price market which the conventional cost curve serves in a fixed-quality market.

Since it reveals the cost of each of the actual options open to producers, this curve will be termed the *cost of options* curve, or, more briefly, the *options* curve.

Referring back to Figure 1, suppose that if quality AC_2 is selected, each firm's share of the resulting market will be OJ; if AC_3 is selected, demanded output will be OK; if AC_4 is selected, OL; and if AC_7 is selected, ON. The curve O, drawn in conformity with these suppositions, shows the possible choices open to the firm.

What shape should an options curve have? If average cost curves were horizontal lines, the options curve would climb continuously upward, showing an increase in unit cost associated with each rise in quality. But since average cost curves are assumed to be U-shaped, a complication arises: vertical variation influences cost in two different ways. On the one hand it alters the cost associated with any given output—that is, it shifts the average cost curve bodily. Its effect along this channel is always the same: a rise in quality means a rise in the cost function, and vice versa. But vertical quality change also alters the actual rate of output (except when the elasticity of demand is unity), so that the unit cost becomes different from what it would have been if output had not been affected. In other words, it causes a movement along the curve. And its effect along this channel is not always the same. Up to a point a rise in quality brings an increase in sales that makes possible economies resulting in a lower unit cost compared with the cost of the same quality produced at the lesser rate; but this effect gradually diminishes in force as output is increased until there finally comes a point where diseconomies arise that raise the unit cost of producing a given quality. Thus for a while the two influences pull against each other; and it is likely that at very low rates of output the

added cost of producing a higher quality will be more than offset by the reduced cost of producing on a larger scale. At such rates unit cost falls as quality is raised, and the options curve has a negative slope. But eventually the two influences reinforce each other, and unit cost must certainly change in the same direction as quality; the options curve then becomes positively sloped, and continues so until that height of quality is reached at which quality raising no longer raises output, when the curve becomes vertical. At still higher quality levels it bends backward.

If a family of U-shaped cost curves were drawn one directly above the other, it would be geometrically possible to draw an options curve which bent more and more in a counterclockwise direction until it showed unit cost falling once more as quality rose to very high levels. But this would be an improbable situation. It should be expected that when quality rises the average cost curve not only rises but shrinks toward the left. In the limiting case in which changes in vertical quality are merely changes in an accounting unit, the minimum-cost output rate must vary inversely with the size of the unit. In that case the locus of minimum points of the family of average cost curves would be a rectangular hyperbola, and no decline in output short of an actual decline in physical volume would keep the options curve from rising.

Since quality reduction is not advantageous unless it reduces unit cost, and quality raising is not advantageous unless it increases demand, we can confine our analysis to that range of vertical variation in which both unit cost and output vary positively with quality, thus ignoring the negatively sloped portions of the options curve.

It must be borne in mind that the position and shape of the options curve vary with the number of firms in the industry. This is because the firm's demanded output at each quality level varies with the number of firms, whereas its average cost curve relevant to each quality remains fixed. Therefore the firm's options curve shrinks upward and toward the left as new firms enter the industry. This complication will be dealt with shortly, when the number of firms is permitted to vary.

Now let us apply the options curve concept to the problem in hand. Under the assumed demand conditions it would not pay the firm to raise quality. At any output larger than OM, cost is higher than price. Quality reduction would be profitable, however. Any one of the four levels AC_2, AC_3, AC_4, and AC_5 would be an improvement. What level will be most profitable? The answer is found by drawing a *marginal cost of options* curve, showing for each rate of output the increment in total cost necessitated by a rise in quality sufficient to expand salable output by one unit. The point at which the marginal-cost-of-options curve intersects the price line denotes the output (and the quality

associated with it) that maximizes profit. This is shown in Figure 1, the marginal curve being labeled MCO. It can be seen that every firm will select OK of quality AC_3. With a change to this new level supernormal profits are earned.

IV. *Long-Run Equilibrium*

We now relax assumption 15a, substituting 15b: The number of firms is allowed to vary. Profits invite entry. When an eleventh firm enters, each firm's demand shrinks to one-eleventh of the market demand.[8] Its output, let us say, is now in the neighborhood of OJ; the firm is in disequilibrium once more. The options curve drawn in Figure 1 no longer holds. In order to determine the equilibrating adjustment needed, a new curve must be plotted, appropriate to an eleven-firm industry. In fact, we need at this point to visualize a whole family of options curves, one for each of the possible number of firms.

How should such a family be drawn? If we think of the options curve as composed of points, each of which lies on some AC curve associated with some level of quality, a new firm's entry causes these points to slide clockwise along their respective AC curves sufficiently so that each point is the same fraction of its former distance from the vertical axis. For each number of sellers these points lie differently and a separate options curve can be drawn.

None of the curves will intersect another; for when the number of firms increases, each point of the newly formed curve must lie somewhere to the left of the corresponding point (*i.e.*, the point representing the same height of quality) on the old one. And since the AC curves are concave from above, and descend more steeply than the options curve, and rise less steeply, each point on the options curve near its right extremity will move downward and to the left when a new firm enters, but the slope of its path will be less steep than the slope of the options curve at that point, while each point near the left extremity will move *upward* and to the left, and the slope of its path will be steeper than the slope of the options curve at that point. Therefore any new options curve formed by the entry of an additional firm must lie wholly within the area bounded by the former options curve.

The curves will also converge as we follow them upward to the left,

[8] It does not necessarily shrink to ten-elevenths of its former demand. A somewhat smaller shrinkage is to be expected, since there is an offsetting factor. Entry of a new firm causes products to be "spaced closer together" horizontally, which may be presumed to reduce their horizontal unsatisfactoriness on the average, and thus to increase the market demand. But so long as market demand grows less than sufficiently to offset completely the shrinkage in the firm's percentage of the market, the firm's demand will become smaller. This must now be assumed to be the case.

since they cannot cross the *y* axis but must continually approach it. And they will also converge as we follow them upward to the right, since each curve in the family must approach the limiting output at which the product must be given away free (or its size made infinitely great if the price remains fixed) and this limit must also be the *y* axis, *i.e.*, an infinitely small number of units.

The family of options curves appropriate to our model is shown in Figure 2. In this diagram O_{10} corresponds to the O of Figure 1, and MCO_{10} to MCO, the subscript 10 indicating a ten-firm industry.

The new output rate is shown in Figure 2 by the intersection of AC_4 and the new options curve O_{11}. It will be profitable for each firm to move to the right along O_{11} (*i.e.*, raise quality) until it reaches an

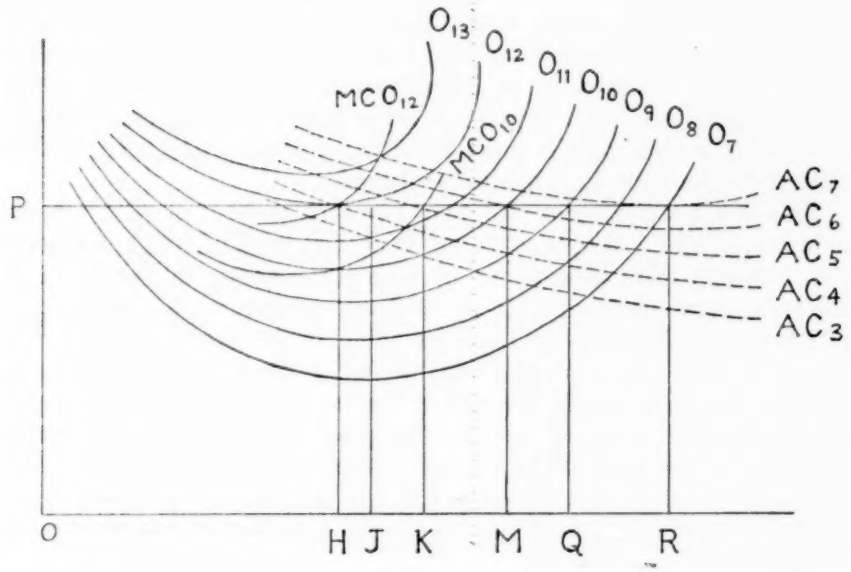

FIGURE 2

output at which its new marginal-cost-of-options curve (not shown) intersects the price line. As O_{11} has been drawn, excess profits will continue to be earned. These will attract further entry, which will cause a further shrinkage in output per firm, which will induce firms to adjust quality upward still more; and this process must continue until excess profits are eliminated. Curve O_{12} is drawn to illustrate the final equilibrium position. With twelve firms in the industry OH is the equilibrium rate of output, and AC_4 the equilibrium height of quality. Thus we see that long-run equilibrium is reached when the options curve shifts

upward and to the left (as new firms enter) until it becomes tangent to the price line.

This is the maximum number of firms (and varieties) possible in the industry. If a thirteenth firm entered, there would be no possible way by which firms could avoid losses.

V. *Alternative Equilibrium Situations*

Different equilibrium positions are reached if assumptions (13a) and (14a) are altered. Suppose, instead of (14a), we assume (14b): Each firm expects the vertical quality of all rival varieties to remain unaltered although actually, since all firms are faced with similar conditions and behave similarly, all firms make identical decisions as to vertical quality. Now the firm's actions are based on the belief that any given cheapening of quality results in a greater loss of sales than before, and any given quality betterment in a greater gain in sales. The options curve concept can be retained, but new curves would have to be drawn, indicating, for each industry-wide level of quality and for each number of sellers, the sales volume which the firm would secure by each vertical change if other firms kept quality unaltered.

This is a more complex situation. For each number of sellers in the industry, a family of options curves is needed, each of which intersects the "industry-wide options curve" (the curve shown in Figure 1) at the point at which the quality of the firm's product is the same as that of the rest of the industry. Let us imagine, in the situation depicted in Figure 1, that one firm varies quality while all other firms adhere to quality AC_6. How should the options curve appropriate to this supposition be drawn? It would intersect the price line where the AC_6 curve intersects it, but it would be a flatter curve—it would intersect the AC_5 curve, for example, further to the left, and the AC_7 curve further to the right—and would be tilted more to the right, so that its minimum point would lie further to the right.

Provided that the newly drawn curve were not so tilted as to be tangent to the price line, it would show the profitability of the firm's reducing quality to some lesser extent—to AC_5, say. Since all other firms likewise reduce quality to AC_5, the firm finds that its output has not shrunk as much as had been anticipated; their action has shifted the firm's options curve downward and toward the right so that it intersects the AC_5 curve at the point where the industry-wide options curve in Figure 1 intersects it. Further quality reduction is now worth while. By a succession of such adjustments the industry reaches its short-run equilibrium, with some excess profits being earned, and entry of new firms invited.

The process of reaching long-run equilibrium involves similar adjustments. These need not be described here in detail. It is sufficient to point out that because of the tiltedness of the options curves (as compared to the industry-wide curves shown in Figure 2), tangency to the price line will be achieved before the number of firms is increased to twelve so that in the final equilibrium quality will be higher than AC_4 and the number of firms fewer than twelve.

Now let us replace the profit-maximizing assumption (13a) with (13b): Firms desire no more (and no less) than an average return on investment, but always prefer a larger to a smaller volume of sales. Their objective is thus output maximization, subject to the condition that average cost does not exceed price.[9] In this case, contraction of output through quality reduction for the sake of temporary profit will be avoided. Expansion of output through quality raising is also undesirable so long as the number of firms remains unchanged, since it entails losses. But if we suppose that each firm believes that a rise in quality will force some competitor out of the market, and is willing to pay a temporary price for eventual gains in sales, quality raising will occur.

If firms, producing OM of AC_6 in a ten-firm industry (see Figure 2) raise quality to the level at which their new cost curve intersects the price line at, say, an output of OQ, and if the market demand should be nine times this output when quality is at that height, sales would temporarily fall short of OQ and losses would be incurred until one firm left the industry; then the remaining nine would earn the "normal" rate of return once more, and on an increased volume of sales. This process would continue either until the minimum point on an average cost curve were reached, or, if that point could not be reached in an industry of more than one firm, until the number of firms were reduced to one. According to Figure 1, a seven-firm industry could produce quality AC_7 at the minimum average cost rate, OR. Here equilibrium is reached. This is the maximum height of quality that can be produced and sold at price OP without incurring losses.

If firms sought to maximize output, yet were unwilling to undergo temporary losses for the sake of growth, no firm would follow this aggressive policy, but would adjust quality to the height at which the unit cost of producing the quality demanded equaled the price. Thus OM would be one of several possible long-run equilibrium positions.

[9] This assumption emphasizes the empire-building aspirations rather than the monetary appetites of business leaders. The writer will not take the space to defend its realism here. For justification, see J. A. Schumpeter, *Theory of Economic Development* (Cambridge, Mass., 1934), p. 93; R. A. Gordon, *Business Leadership in the Large Corporation* (Washington, 1945), pp. 305-12; J. M. Clark, "Toward a Concept of Workable Competition," *Am. Econ. Rev.*, June 1940, XXX, 247.

Which position was actually reached would depend on the number of firms that happened to be in the industry.

By varying our assumptions we have found several alternative sets of conditions of long-run equilibrium: (1) that in which the number of varieties (among those numbers capable of being produced at a cost equal to price) is maximized, quality height being adjusted to the level necessary to achieve this maximization; (2) that in which quality height (among those heights capable of being produced at a cost equal to price) is maximized, the number of varieties being whatever number makes possible this maximization; and (3) various intermediate positions, in which vertical quality is higher than in the first case though less than in the second, while the number of varieties is greater than

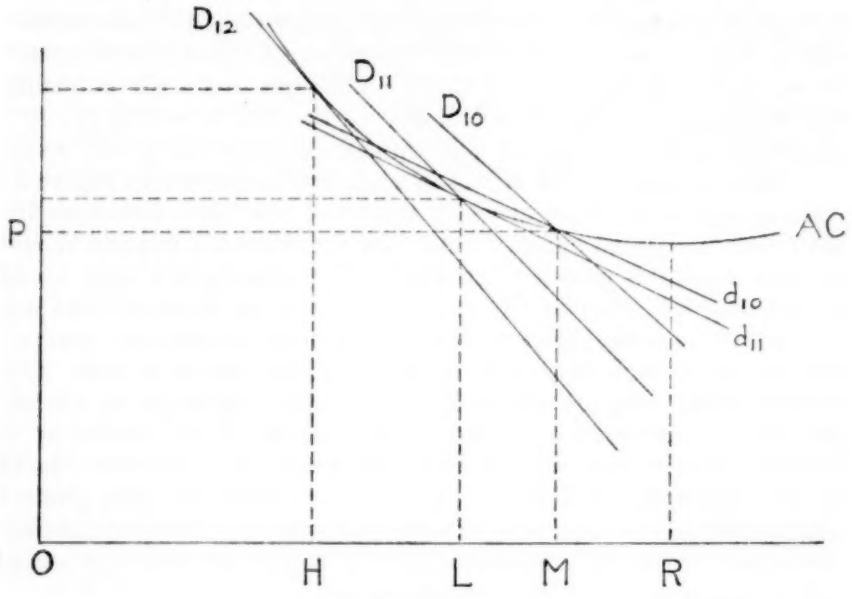

FIGURE 3

in the second case though less than in the first. We have located a *range* of equilibrium positions.

That there is a range rather than a single position is not due to the fact that competitive adjustments are forced to take the form of quality changes rather than price changes. The equivalent of each of these positions can be shown on a conventional diagram of a firm selling a differentiated product of fixed vertical quality in a monopolistically competitive market.

Equivalent to the case of concurrent quality changes is the case of

concurrent pricing, which, when employed by profit-maximizing firms, maximizes joint profits. Each firm adjusts its price on the basis of a demand curve which is $1/n$th the industry demand curve, n being the number of firms. In Figure 3 such a demand curve is shown as D_{10}. If firms have been producing for a market in which price has been fixed at OP and are now free to alter the price, they can gain supernormal profits by raising the price. But entry of new firms will shift the demand curve leftward. Equilibrium is attained at OH when the curve reaches the position D_{12} where it is tangent to the cost curve.

The equivalent of our second equilibrium position can also be shown. Its conditions correspond to the Chamberlinian assumptions. Each firm's demand curve (based on the expectation that prices of other varieties remain unchanged) is more elastic than the curve showing the volume of sales when all competitors' prices change too. Equilibrium is attained at OL when entry of new productive capacity pushes D_{10} leftward to the position D_{11}, where the firm's demand curve, which was d_{10} and is now d_{11}, becomes tangent to the cost curve.

The equivalent of our third equilibrium position, based on desire to maximize output, acceptance of average-cost pricing as a norm, and willingness to take temporary losses, is at OR.

These comparisons enable us to see how similar to price variability in its final effects is vertical quality variability.

VI. *Implications of the Analysis*

The writer is fully aware of the limited scope of the analysis just presented. The model studied illuminates only one small corner of the great arena of quality competition.

By restricting ourselves to a study of *equilibrium,* we have obtained a picture of competitive behavior with regard to quality variability which is highly artificial and seriously incomplete. This is unavoidable. A prerequisite of equilibrium is the attainment of perfect knowledge (or, alternatively, an unalterable state of knowledge). Equilibrium analysis therefore turns its back on the semi-ignorance, uncertainty, and exploratory character of real-life economic activity. The typical patterns of quality competition are in large part founded on disagreement as to the best means of satisfying wants, and reflect the continual experimentation that is so strikingly characteristic of economic behavior. Innovation is intelligible only when viewed in such a setting; it is inherently experimental, risky, a challenge to the current state of knowledge and currently prevailing attitudes. Equilibrium analysis, on the other hand, necessarily assumes that the newest ideas have become common property, and have been tested out long enough so that their

value is no longer in doubt. It therefore omits this important aspect of economic behavior, revealing only those aspects of quality competition that are connected with cost differences and the diversity of wants.

By further restricting the analysis to a study of *vertical* variability of quality, we have neglected the important area of horizontal variability, in which decisions regarding quality affect the range of choice open to buyers, and the degree to which products conform to buyers' needs and tastes and are suitable to the uses to which they are put.

Our analysis would also have been more comprehensive if it had not abstracted from certain frequently found conditions in the real world—for example, semi-ignorance, gullibility, and the bewildering complexity of choice when quality variability is multidimensional and information about quality and product performance is not readily available.

Nevertheless, the analysis has been of some use. It has made clear one thing which may be familiar enough to observant students of economic life but which customary methods of economic analysis do not show: namely, that vertical quality competition performs essentially the same functions that price competition performs. Whenever price is excessive relative to product—or, to put it the other way round, whenever product is deficient relative to price—it causes producers to revise their offers, making them more attractive. Thus, like price competition, it induces behavior which results in the elimination of excessive profits. Similarly, the firm's equilibrium position in a fixed-price market with vertical quality freely variable appears to be identical with the position reached in a fixed-quality market with price freely variable. When products are horizontally differentiated, and when firms seek to maximize profits, the firm's output falls short of that at which unit cost is minimized. It could also be shown that, when horizontal differentiation is lacking, output settles at the minimum-cost rate. Thus vertical quality competition, like an able understudy, steps into the breach when price competition ceases to function and brings about results usually associated only with price flexibility.

The analysis thus makes it clear that a uniform, unchanging price is not necessarily evidence of lack of competition. Absence of price variation may indicate merely that competition is restricted to the quality dimension. Only when quality is also uniform and rigid is competition lacking. Unless economic investigators are aware of the inverted "price" competition that can occur when vertical quality is variable, they may be led into serious error in their appraisal of the competitiveness of certain industries.

In industries characterized by quality flexibility, the term *price*

rigidity is inappropriate, since it has no economic significance. The term is surely misused when applied to situations in which the price of B on Tuesday is the same as the price of A on Monday; it can be meaningful only when both prices refer to the same product, and to a specified unit of specified quality. When the unit is fluctuating in size or quality, we are moored to a shifting anchor; price would have to fluctuate similarly in order to produce a situation comparable to that of a rigid-price, rigid-quality market.

All this suggests the need for a broader approach to the oligopoly question. Unless quality is uniform and invariant (and actual prices coincide with published prices) the price theorist's analysis of oligopoly is based on incomplete data. The extent to which the results associated with competition are realized in an oligopoly situation cannot be correctly assessed without taking into consideration conditions with respect to quality differentiation and variation. Model-building of the sort attempted in this paper may help to turn the attention of economists to factors in market situations whose importance has hitherto been underestimated.

"REALISM" IN POLICY ESPOUSAL

By CLARENCE PHILBROOK*

Economists in general have learned to live under the recurring charge that they are "unrealistic." The term may, of course, mean many things. Where the meaning applies to what they do strictly as "scientists," the barbs need not go deep. Against such slings and arrows there hangs ready a familiar armor—namely, the prestige of scientific method, made magically tough by having clothed also those heroes of the battle for knowledge, the natural scientists. Not always are economists content, however, to remain "scientists" describing relationships and eschewing reference to the desirability of things, or even to remain "engineers" suggesting devices to achieve ends laid before them entirely by others. They do step out of these rôles and give their society, or some sector of it, advice which commits the adviser to responsibility for value judgments.[1] They do "take positions"—act as advisers in a full sense. In this rôle too they are often faced with the charge of being "unrealistic."

Used in this connection the epithet becomes a different missile and will not be turned aside by the same armor. What range of meanings may possibly attach to the term need not for present purposes be explored. One particular connotation which it frequently carries will be singled out and attributed to the word. This meaning is, that the economist charged with "unrealism" has made recommendations requiring for their fulfillment changes in things which must, for the purpose at hand, be treated as unchangeable. It would be brash to deny that such a charge may often be true. A basic responsibility implied in it has, at any rate, a valid claim to attention: *of course* the economist, to give useful advice to society, must regard various things as in a significant sense beyond our power to alter. Failure to do this seems virtually a definition of idle dreaming. Wherever he has failed to be guided

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[1] Throughout this paper the word "advice" and terms used synonomously are to be interpreted in the broadest possible sense—to include any recommendation, inside or outside the classroom, made without hypothetical purpose clauses more restrictive than the necessarily implied aim to achieve the desirable.

properly by this precept, the economist must indeed confess that he has sinned.

Yet there is a more cankerous sin which economists have all too often committed in order to escape indictment. So great has become the scramble to turn state's evidence, that one who suggests a solution not treating as "given" ("here to stay") any particular popular social practice is merely fortunate if no colleague misquotes him Carlyle's response to Margaret Fuller's decision to accept the reality of the universe: "Egad, you'd better!" The charge of "unrealism" is used with telling effect to discredit policy recommendations without adequate consideration. It probably affects in no small degree the determination of what types of work are respected and supported in universities. Science has rightly been said to aim at stability of belief by cultivating doubt; but the spirit behind the familiar charge, by restricting the range of questioning deemed worth while, limits the use of science for this fundamental purpose. In so doing that spirit, on the negative side, creates a presumption that the time of scholars is readily available for other activity, and, on the positive side, implies that worthy uses for time must be sought elsewhere. It therefore fosters a test of scholars which, at a moderate stage of development, asks whether their activity is "constructive" (Does it build, not tear down? Does it look forward, not backward?) and, at a now common extreme, asks whether their activity immediately and discernibly influences practical affairs. Of course the man least demonstrably ineffectual is he who advises others to do what he knows they will do without his advice. Indeed, the competition for reputation as "realists" works toward a condition in which students of society are loath to take a minority position. Society tends as a result to lose the benefit of that disinterested, fundamental, continuous criticism which, unless provided by persons made independent of practical affairs for that very purpose, is unlikely to be forthcoming. There has grown a widespread practice of cooperation with "things as they are," without explicit criticism of them, which is bound to have the effect of active approval regardless of whether such is intended. Thus, the spirit of "Egad, you'd better!" bids fair to render the field of political economy not merely useless but actually damaging to the social welfare.

However, I wish to invite contemplation and discussion; for the practical consequences hinging upon the treatment of this issue are enormous, and yet the matter seldom crosses the threshold into systematic consensus-seeking, but rather remains a little-explored source of recurring irritation and *ad hoc* dicta. I should like, therefore, to avoid resting upon the controversial conclusion stated above, and find a more neutral point of departure.

Perhaps this can be found along the following lines. In deciding what advice to give, one clearly must regard some conditions as given. On the other hand, the very fact that some one is to be advised to do something which presumably he might not otherwise do means that not everything in the situation is being treated as given. Evidently what is at issue is "correctness" in the selection of things to be so treated. If we can find literally no criteria, consensus on policy is indeed hard to come by. It must then be impossible to force the "unrealist" to regard the necessary things as fixed; and, on the other hand, his critic can always, by "realistically" accepting the universe of his choice, find sanctuary against the necessity of defending his own positive policies. Is it possible to say anything helpful toward consensus about what actually constitutes "realism," in some defensible sense, in the selection of proposals on policy? It may turn out so, if we explore a path through a series of intellectual positions, asking how far it may reasonably be supposed that plaintiff and defendant can walk together and where they might feel forced to part company. The method will be to start with a position which a "realist" surely will not think labels alterable any conditions which are not so, and progressively introduce elements which he might consider less "realistic," at each stage inquiring whether he really would be likely to reject the new element. Finally the question will be raised whether the "realist" can reasonably insist upon any principle which would enable him to use meaningfully the familiar charge. An effort will be made to maximize the ease with which any telling rebuttal that may be available against the argument of this paper can be made, so that if the conclusions reached here are wrong the fact may be made clear and many of us may mend our ways in keeping with a sound "realism."

The position most safely "realistic" would seem to be that which took *everything* in the situation as given, including both the physical universe and the attitudes of all persons. One who adopted it would presumably interest himself exclusively in the discovery of regularities and the forecasting of events. The fact that this view by no means corresponds to the scientific outlook in total does not assure that the two are never thought to be identical. Such identification probably accounts in no small measure for the high prestige of simply any "empirical" research as opposed to "arm-chair theorizing": almost any conceivable collection of figures will be regarded in important quarters as representing a certain hard-headed practicality, while any serious discussion of what is the real significance of the collection is considered either jealous carping or mere mental gymnastics by minds too lazy to do "constructive" work. Finding "what the facts are" is the great task

according to this view; for, if they were once discovered, we should then be in position to make forecasts.

This position has great appeal to men of scientific bent, and indeed to all of us. It is "obvious" to common sense that every effect must have a cause and that any state of mind must be an effect of preceding states of mind, body, and environment. To be sure, some embarrassment may arise in trying to find a function and purpose for the scientist himself; for, although the surrounding stimuli may cause him to emit sounds and cause us to call the sounds a forecast, he cannot in this view "influence" anything, and the notion of function, including that of purpose, is itself meaningless. Nevertheless, the mere fact that an analyst will typically use words which imply that his conclusions are yet to be determined by the effort of investigation or discussion does not prove the deterministic position false. Activity that is apparently purposeful may be viewed either as the result of a free will operating with its available means toward some goal, or alternatively, as the movement of a set of pre-established forces working toward equilibrium. In the determinist view the pseudofunction of the scientist is that of a cog in a machine. The tempting query why, if determinism is true, the scientist would struggle as he does, or society pay him to do so, is itself meaningless, for "would" no longer can connote volition and "struggle" has no meaning; he and society do not do, in any significant sense, what they think best—they simply do.

The well-known and fatal difficulty with the deterministic attitude that we must treat everything as given is that the truth of its opposite also is obvious and is inevitably dominant in our procedure. It is certainly impossible for the mind to act regularly as if it regarded itself as an epiphenomenon accompanying the burning out of a physicochemical reaction. Although nuclear physicists could not alter the fact of the fissionability of the atom, it is said that some of them believe they could (as well as should) have refused to discover the fact or, at least, to put it to its most famous use. No analyst will, where it counts, cling to a purely deterministic position. All will "play like" their "decisions" are decisions in the common-sense meaning of the word and capable of affecting reality.

Social analysts as advisers will, then, take at least one step away from regarding everything as given and still feel themselves to be "realists." The most modest step is exemplified where the analyst occupies an administrative post with some discretionary power. A man in that position would believe that the word "discretion" had some meaning—that the external situation could be influenced by a *decision,* such as, for example, to allow a certain wage rate to be raised. The step is modest in

that it leaves the scientist in the same instrumentalistic relation to the situation as he might bear to a group of chemical materials to be manipulated. Further, nearly all social analysts would take another step without at all losing a sense of "realism," in believing that they might actually influence the world by giving advice to crucially placed administrators or legislators—on occasion simply by making evident to them the truth of a cause-and-effect sequence or the validity of a value. Indeed, adding together these two steps, we have the basis for what appears to be regarded as the most valuable activity of analysts as social advisers, although a relatively high respectability seems to attach also to the act of advising organized pressure groups.

The range of possible change, and of influence of the social adviser, is relatively narrow if channels of influence are restricted to those just mentioned. For most important changes (usually legal) require a change of attitudes on the part of a large number of persons. This need not appear true, to be sure, to one willing to take a purely instrumentalistic view. In that outlook, the range of action would be considerably broader, since it would be possible to advise holders of power to use their power "for the good of the people" with small regard for what the people thought they wanted. Indeed, much recent history of government might be accounted for in terms of a general belief that "realism" is violated by those who hope social advisers may have influence otherwise than directly. This instrumentalistic position need not disavow the possibility of change in mass attitudes: a benevolent government may "educate" the people to agreement with its measures. This is a clear-cut, possible intellectual outlook; but if such neo-Machiavellianism is to be espoused, the social scientists adopting it should make as clear as they can that they have given up hope of that consensus-created, not merely consensus-creating, government which is usually called democracy. Those who believe that consensus should precede political action must, it is merely tautological to say, believe the archetype of their "action" as advisers to consist of effort to help others discover correct attitudes; so we may suppose that, in considering attitudes to be among the alterable conditions, we still have the company of "realists" whose ultimate values include a rôle for democracy.

Since important changes in society do require alterations in the attitudes of many persons, social analysts, in order to form opinions on what changes would be worth while if they could be brought about, must often consider at great length what processes would go forward under assumed conditions which are often at variance with the facts. Strangely, by carrying on such considerations carefully rather than carelessly, men call down upon their heads some of the most scornful

charges: "unrealistic," "too theoretical," "purist," and the like. Yet it is difficult to see what could be more "unrealistic" than saying that a change would be worth while (unless mere change for its own sake is the sole issue) without first methodically considering what results might reasonably be expected. So surely it may be assumed that the school of "realism" would accept the study of "models," or "theories," as indispensable.

It is in deciding what alterations of attitude to attempt, that the point arises which presumably most persons stressing "realism" have in mind. Should we not, they might ask, distinguish among conceivable changes according to whether we stand some reasonable chance of actually effecting the necessary shift of attitude? Why waste effort by making suggestions which we cannot hope will be accepted? These queries appear to have much justice. The idea obviously is that one ought to list the actions open to him and attach to each a weight determined by the probability that it would in fact bring about the attitude change intended.

If we described a "pure realist" position as calling for decision by simply selecting the advice with the highest "probability" weight, we ought to be able to treat it as only a straw man. To be sure, the mere fact that most "realists" would reject an approach so stated does not mean it really differs from what they have effectively in mind; a major part of the thesis of this paper is that numerous economists are in effect espousing positions which, if stated clearly, would be repudiated by them. Nevertheless, one fatal criticism of any such bald "probability" approach must surely be treated as noncontroversial. No one would explicitly maintain that a high relative probability of having *some* effect should give priority to an act completely without regard to the relative desirability of the outcome it would tend to have. It seems reasonable to suppose, therefore, that the "realist" would accept as a part of "realism" the necessity of consulting end values as determinants of advice.

It becomes important, then, to recall what is required in due allowance for this element of "realism"; for, although few would deny its claims in the abstract, many become quite impatient when called upon in specific cases to give full weight to it. (Who having experienced the earlier years of the New Deal can forget how frequently the conclusive defense of almost any policy was that the government was *doing something*!)

Evidently the adviser, having arrayed the lines of advice he might give on a particular issue, must assign a weight to each according to the desirability of the change it would tend to promote. A change can be desirable otherwise than for the sake of novelty only as it furthers some

end. But since there are conflicts of ends, an action may further one end and lessen the realization of another, and the net significance cannot be known without first evaluating the various ends (or degrees of realization of them). Relative evaluation requires a common measure, hence can be accomplished only if the "ends" are but intermediate, serving in turn as means to, and deriving their value from, a more general end (which itself is merely one of a number of ends all serving as means to a yet more nearly ultimate goal.) Assigning the correct desirability weight to a change means judging its net influence upon the realization of some end sufficiently general ("high") to include all the intermediate ends touched by the change; and this judgment involves tracing the effects of the change upon each intermediate end and evaluating those effects in each case by reference to the inclusive end. Thus, literally full justification of the whole set of value weights one attaches to a set of policy suggestions would require laying bare the relations between the proposed changes and some all-subsuming, ultimate end of social organization. Only in this way could the mutual consistency of all the various means and subsidiary ends which constitute a total program for society be established.

In discussion aimed at consensus, the problem is one of showing a disputed policy to be a means to some intermediate end and then inquiring, of parties to the discussion, whether this "end" is in their view necessary as a means to what they regard as some more fundamental goal. If not, agreement is not logically called for. The proponent must then try to show that the disputed "end" is a means to something he himself regards as a more fundamental end, and if successful repeat the query. It is for present purposes unnecessary to dwell upon the complexities hidden under the light reference to showing a disputed end to be a means; what is needed is merely a suggestion of the extensiveness of the obligation taken on by acceptance of the necessity of value weights and consensus. If consensus is to be soundly reached, a process of the sort indicated must go forward until the derivation of importance is traced back to some end the authenticity of which is accepted by the parties to the discussion. Fortunately, it is usually not necessary to go far toward ultimates; but the ideal student of policy, far from refusing to talk about the sheer desirability of a proposal opposed to his own, would stand ready and eager to reduce the two, no matter how different, to commensurability in the manner suggested.

There is good reason to be appalled by the difficulty of the task cited, especially in a world become self-conscious and discordant about its values. It is of no avail, however, to assail as "purists," "absolutists," or "unrealists" those who call attention to the task. The only alternative

to readiness to defend a position in the sense indicated is to grant that at least some of one's means and intermediate ends have not been tested for mutual consistency, and that one's policy proposals have therefore no more authority than some diametrically opposite set. These considerations surely place a demand upon an economist giving advice on social policy that he shall have thought his way through, so far as the state of knowledge makes possible, to an internally consistent model of economic organization on which he bases his advice. The gravity of the potential effect of error in policy, and the immensity of the scope for growth and ripening of intellect toward power to grapple with the problems involved in discerning good policy, render merely ludicrous the widespread impatience toward "arm-chair theorizing," which, unless the integrity of the men involved is in question, must be regarded as an arduous process of critical contemplation and integration aimed at the development of wisdom.

Of course nothing in the foregoing discussion denies the notion that the end must be dealt with in the light of the availability of means. Neither is it affirmed that "the end justifies the means" in the sense that there is any end for the furtherance of which no device is too bad; but the ultimate end itself must contain criteria of acceptability of means, so that the means, if justified, are indeed justified by the end. Even though strong doses of starvation might have shortened immensely the employment depression of the 'thirties, the ends of the society justified the relief of distress. These things are probably all that need saying about the perennial argument over the short-run versus the long-run view in the selection of policy; yet one's faith that the full import of attributing value weights is noncontroversial is bound to be shaken by memory of how often any manifestation of the long-run view is answered with some form of the completely irrelevant "realistic" proposition, "In the long run we are all dead." Although this reaction has done much damage to the search for sound policy, by limiting the consideration of ends, it may nevertheless reasonably be interpreted as something other than repudiation (in the abstract) of thinking in terms of ends and means. Indeed, it is probably as a rule a confused, distorted, and misapplied criticism, not of means-ends thinking, but of presumed failure to apply fully such a calculus. More often than not, the thought reflected is simply a generalization of the example given above: the idea that the time dimension must be allowed for—that radical change takes time and meanwhile we must make the best of the situation, perhaps by means which hamper realization of some accepted goal. To be sure, a proposal involving thought of the long run might often be criticized because it seemed to violate the true

"probability" approach, which we shall in a moment try to state. But, it may be taken for granted, relatively few "realists" would question that in such an approach value considerations must have a place.

It seems possible now to sum up the most likely meaning of a "probability" approach—a position which must be the one that would be held by any who, in the light of considerable discussion, still were willing to make use of the charge, "unrealistic." Although in some cases only under pressure, they surely would accept these propositions: that many elements in a social situation are capable of change, including the attitudes which determine policy; that actions of individuals in their rôle of "social advisers" could have some influence on those attitudes; and that the advice to be given by them cannot be chosen without the aid of weights attached to different lines of advice according to the relative desirability of the change which these respectively would tend to further. They would insist, however, that a choice can be made only after superimposing another weight on each line of advice according to the probability of its taking effect if offered. Men called "unrealistic" are those who disregard this principle and presumably those who assign probability weights incorrectly.

There is a considerable appearance of reason about this method of thought. Still, it requires the most careful inspection.

It is important not to slight the fact that two lines of advice such as typically give rise to controversy over "realism" are not necessarily so related as to make "probability" considerations relevant at all. A believer in states' rights, for example, presumably may make clear his belief while yet offering good counsel on how best to operate a program which disregards such a conception. The relation required if "probability" is to have any place is that the two lines of advice be truly alternative—that is, mutually exclusive.

Two possible causes of mutual exclusiveness are suggested. First, sheer limitation on time, energy, and intellect requires specialization; and some decision must be made as to the field in which to develop special competence. May one not make an ample contribution by advising the Federal Reserve authorities how best to use their powers, without questioning whether the present banking system is the best conceivable? Actually, specialization raises no problem. The question is whether, not having studied the possibilities of alternative systems, the specialist causes or allows it to be supposed that his activities constitute support of this system against alternatives, or whether, having decided another system would be better, he conceals the fact. If one applies "probability" thinking and recommends that approach for others, it must be from sources other than specialization that he derives the implied mutual exclusiveness of different pieces of advice.

The second cause of mutual exclusiveness which the "realist" presumably has in mind is that the very act of approving a different general course may destroy power to guide action along the best path in an established, although less desirable, direction. There is no denying that suggestions from one listed among the faithful with respect to a program are, as "self-criticism," more likely to wield influence than is advice from "outsiders." Thus we can identify conceptually a type of case in which the lines of advice are alternative in a sense sufficient to justify at least entertaining the question of whether it is desirable to be guided by "probability."

It goes without saying, that the mere identification of such a class of cases gives no license to beg the question of whether any particular case belongs to the class. If indeed "probabilities" are sometimes a proper guide, the epithet "unrealistic" can at best be justified only upon an explicit showing that giving one of the lines of advice does preclude the usefulness of giving the other. But even for use in cases where "probability" is formally relevant the "probability" approach is open to grave doubt on a number of scores.

In the first place, what is the criterion for the relative weighting of a "degree of probability" and a "degree of desirability"? There is always the devastating possibility that the total weight of an action in keeping with a completely evil outcome might be greater than that of one tending to further a desirable end. Suppose that in Germany under Hitler it appeared that one hundred thousand Jews would probably be bayoneted to death. Should I, if a German, have suggested merely a less brutal execution by gas—thus quite possibly doing *some* good—or should I have cried out against the whole idea, quite probably having no discernible influence? And, if I decided on the former, should I have claimed credit as a "realist" and decried as "unrealistic" any who advised the society to let the Jews live?

In the second place, the problem of actually assigning "probabilities" must be faced—some aspects of which are relegated to our third and fourth points. At present we may consider the matter from a relatively uncomplicated point of view. The task of assignment involves knowing attitudes, including in some sense their "strength," and the force of the impact of each suggestion under consideration as tending to change them. Diffidence about analyzing matters of "attitude" would become us, for there are indications that merely agreeing upon a scientific content for the term might keep sociologists busy for some time. However, it appears that an attitude rests upon at least these underlying factors: a value system, the "brute" elements provided by the senses, and theories relating these elements. Thus, basic to assigning "probabilities" would be a knowledge, with respect to each person affecting the adop-

tion of a policy, of how these factors combine in him to form attitudes, including what is the "marginal influence" of changes in the respective factors. Given such information, successful forecasting would require discerning also exactly what persons the advice would reach and in what form and, for each person reached, just what changes would occur in each of his attitude-making factors. (Since forecasts are, for the purposes in question, to run in terms of probability distributions, the knowledge required—whatever its nature—would be more rather than less complex than these statements suggest.)

In the case of an official economic adviser to one or a few immediate determiners of policy, presumably sufficient knowledge for a forecast might be possessed—although it would be naïve to take for granted that the enigma which man presents to man regularly yields to the degree of intimacy involved in such a relationship. However, to assay how appropriately the cited requirements might in general give pause to a forecaster, it would be well to recall what must be meant by "lines of action" open to economists as social advisers. These vary greatly as to immediacy of impact upon policy, ranging from the report of an official adviser, through systematic promotion (honest propaganda), down to a mere planting of seeds of thought whether in the classroom or in casual conversation. Evidently the overwhelming majority of "actions" exercise their effects quite indirectly. What is the "probability" that a policy-influencing marginal change in attitudes will result from planting an idea, or the means of arriving at good ideas, in the classroom or in an address or in social intercourse? With what degree of immediacy, both in point of time and in point of the number of intermediate impacts? A mere showing of difficulty would not invalidate the conception of a "probability" approach. But it would scarcely be extreme to suspect that estimates of "probability" would in the case of most expressions of espousal have a probable error so large as to render them "statistically" insignificant.

The knowledge stipulated as necessary was not characterized as sufficient for the appraisal of "probabilities." Indeed, contemplation suggests some mystery about the very nature of such a process in the kind of universe in question. These facts suggest a problem which for emphasis we may single out as our third point: a fundamental difficulty in the very notion of "probability" as a property of the force of a piece of advice. Unless the intent is simply to lead others to act under false impression of the results to be expected, advice consists of making evident the soundness of an idea and relying upon the resulting recognition of that soundness to cause action based upon it. The force at work changing attitudes is, then, "idea force." "Probability" implies a mechanical relation, some kind of quantitative continuity. But correct conclusions

cannot flow from treating "idea force" as if the law of conservation of energy applied to it; for, however an idea may get into a mind, it is capable of dying there or of gathering immense force. Moreover, a number of minds can be seeded with one expression of the idea. Potentially, then, the force may grow at an astronomical rate. All the determinants of whether it dies or gathers strength in a particular mind, we simply do not know. We do know, however, that that which is believed to be true has an appeal to the mind believing it, over and above the attraction it may have on other grounds: truth has a positive appeal in its own right. Although other appeals may swamp this one, there is no limit to the possibilities of its breaking through and causing action. The degree of apparent influence of the person holding an idea is, therefore, no measure of the potential effect of his giving utterance to it. If there is one belief fundamental to, and universal in, our culture, it is this notion that truth as such has power. Such justification as may exist for the hope of a better world lies here and here only. In the face of these considerations it seems doubtful, not merely whether we can effectively measure "probabilities" for different "actions" upon attitudes, but indeed whether any real meaning attaches to the conception.

In the fourth place, to guide oneself by a "probability" calculus is one thing, but to say then that all persons should do likewise is to fall little if at all short of nonsense. There might be some sort of rationality to urging that others espouse according to value weights only, so as to leave one or a few free to add the "probability" factor. The latter procedure implies estimating the current division of the forces of espousal and deciding whether one's own influence would suffice to change an inferior force into a superior. Evidently, then, much of the force exercised by others must have been somehow committed. If all, however, follow the "probability" principle, no one can commit himself until many others (nearly all?) have committed themselves. Thus, for keeping public affairs relatively free from the influence of the disinterested, the "probability" principle would be a reasonably effective device.

Since it would seem harsh to attribute to the "realist" a meaning so patently foolish, an attempt at a different interpretation may be appropriate. Although the inference does not appear obviously logical, could the actual meaning involve a process in which the many individual advisers, each with the "probability" factor in mind, somehow simultaneously determine their respective positions? If so, to be sure, the implications are still not attractive. Major economic policy, in so far as it is influenced at all by economists, apparently ought to be the product of infinite involutions of guesses by each about what others are guessing about what he is guessing about what they will advocate! However, for example, having advocated farm-price supports on grounds of their

"probability," it appears that one may take a fearless stand in favor of ninety per cent of parity as opposed to ninety-five per cent—unless, indeed, the probabilities are too much against that. It is a depressing picture of the rôle of representatives of that higher learning upon which much of the hope of social improvement has sometimes been supposed to depend.

In view of the preceding point, a fifth one is evident: the "probability" approach rests upon an ethical atomism which might reasonably be supposed long ago to have been barred by a well-established principle of ethics, that a precept is unacceptable for one man unless it would have an acceptable outcome when followed by all. In the face of this principle, how can the degree of immediate influence of a scholar upon practical affairs be deemed a matter of greater concern than the desirability of the direction of such influence as he does wield?

A sixth and major indictment of the "probability" approach, although contained in much of the preceding discussion, should be made explicit. Fundamental to such a procedure is the fact that, while believing one course to be the best, I say or allow it to be thought that I believe a different one to be the best. That is to say, the approach explicitly calls for the active or passive concealment of truth. It should scarcely be necessary to argue against an idea which so patently strikes at the foundations of scientific integrity.

If the thoughts assembled here are sound, men will best serve the cause of social welfare if they refrain both from disposing of opponents as "unrealistic," in our defined sense, and from bowing to fear of that charge in selecting their own positions on policy. Degrees of "probability" are incommensurable with degrees of value, and ethical considerations do not permit the former to outweigh the latter. The assignment of "probabilities," even with a highly oversimplified conception of their meaning, would in the great majority of cases be so difficult as to become absurd. The nature of "idea force," moreover, makes it doubtful whether any real meaning attaches to the very notion of "probabilities of success" of different lines of advice and whether, therefore, there can be any such weights to superimpose upon value weights. In any case, to call the "probability" approach proper for all who take a position on policy would be to advocate a practice which would remove any rational basis which "probability" estimates might be imagined to have, by reducing all policy position-taking to a logically impossible universal mutual anticipation ending only in universal support of the *status quo* (in so far as change depends on deliberate human planning), and which would of course divorce policy selection from reference to value. Finally, the required concealment of truth is intolerable to the most

fundamental conception of the scholar's reason for being. The "probability" approach must surely be rejected, to say nothing of its being considered prerequisite to respectability. Only one type of serious defense of a policy is open to an economist or anyone else: he must maintain that the policy is good. True "realism" is the same thing men have always meant by wisdom: to decide the immediate in the light of the ultimate. The economist must follow this ideal as best he can—in humility and in readiness to compare notions both of technical relations and of ultimate values.

"FULL EMPLOYMENT" 1955–1960—A FEASIBILITY TEST

By ROBERT STANLEY WEINBERG*

It is my purpose in this paper to outine a set of supply and demand requirements for "full-employment" in the period 1955 through 1960. In Part I a simple model defining "full-employment" in terms of total output, Gross National Product, is developed. Part II considers recent past trends and empirically projects a set of annual "full-employment" GNP levels consistent with the model outlined in Part I. Part III contrasts the total supply estimates derived in Part II with the projected demands of the consumer, business, government, and foreign sectors of the economy to test the feasibility of "full employment" under various assumptions. Finally, Part IV summarizes the implications and feasibility of "full employment" through the 1955–1960 period.

I. *"Full Employment," a Simple Model*

This oversimplified model considers the interrelationships between seven broad variables, the population (P), the labor force (L), employment (E), unemployment (U), the length of the average work week in hours (H), productivity, the output per man-hour labor input (T), and total demand (GNP).

The interrelationship between these variables can be defined with the following set of equations:

$$L = f(P) \qquad \text{I:I}$$

The labor force is a function of the population, that is, the size of the labor force is related to the size of the population.

$$L - E = U \qquad \text{I:II}$$

This equation is merely the definition of unemployment. Unemployment is equal to the difference between the labor force and employment.

$$\frac{GNP}{(T)(H)} = E \qquad \text{I:III}$$

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Equation I:III defines the level of employment as the quotient of GNP divided by the product of productivity, output per man hour, times the average hours worked.

At this point we may now introduce an eighth variable, minimum frictional unemployment (U_f), or that level of unemployment that will be acceptable at a "full-employment" level. By definition, "full employment" will exist when $U = U_f$. The exact level of demand required to attain a level of "full employment" is that level of demand that yields the identity

$$U = U_f \qquad \text{I:IV}$$

To arrive at that level of demand required to attain exact "full-employment" equations I:II through I:IV can be solved simultaneously to yield equation I:V,

$$\overline{GNP} = [L - U_f](T)(H) \qquad \text{I:V}$$

where $\overline{GNP}$ is equal to the level of demand required to sustain exact "full employment."

If U_f is taken as either an absolute (*i.e.*, millions of workers) or a relative (*i.e.*, a percentage of the labor force) constant, equation I:IV determines $\overline{GNP}$ in terms of three variables, L, T, and H.

The expression $L - U_f$ can be replaced by E which represents the level of employment at a "full-employment" level. Similarly the product of T times H can be replaced by a single term Z, where Z represents the output of one worker, *i.e.*, the workers' hourly rate of output times the number of hours worked.

Equation I:V is now reduced to simply:

$$\overline{GNP} = (\overline{E})(Z) \qquad \text{I:VI}$$

For the purposes of future discussion we will consider projected levels of $\overline{E}$ as being primarily the resultant of a set of unique combinations of various demographic, sociological, and economic factors, Z will be considered as being primarily the resultant of a set of unique combinations of various technological and economic factors.

The supply and demand estimates developed below should not be considered as forecasts, but rather as long-term trend projections. These projections assume a continuation of the basic trends indicated below. It should be remembered that in reality, at best, we would expect the "actual" levels of supply and demand to fluctuate about the trend values shown below.

II. *Some Empirical Projections of "Full-Employment" Levels*

Part I presented a generalized oversimplified model defining full employment in terms of "full-employment" levels of Gross National

Product. In this section a set of "full-employment" GNP levels will be projected consistent with the basic conditions outlined in the derivation of equation I:VI above.

We will begin our analysis with a projection of the size and occupational distribution of the labor force for the six-year period 1955–1960 as shown in Table I.

TABLE I.—THE LABOR FORCE EMPLOYMENT AND UNEMPLOYMENT, 1955–1960

(millions of workers)

	1955	1956	1957	1958	1959	1960
Total Labor Force	69.1	70.0	70.8	71.7	72.6	73.5
Armed Forces	3.0	2.5	2.2	2.0	1.7	1.7
Civilian Labor Force	66.1	67.5	68.6	69.7	70.9	71.8
Total Employment	64.5	65.8	66.9	67.9	69.1	70.0
Nonagricultural	52.0	53.5	54.8	55.8	57.2	58.0
Agricultural	6.5	6.4	6.3	6.2	6.1	6.1
Government	6.0	5.9	5.8	6.0	5.8	5.9
Federal	1.9	1.7	1.5	1.5	1.2	1.2
National Defense	.9	.75	.56	.55	.35	.35
Non-National Defense	.96	.95	.94	.92	.9	.9
State and Local	4.1	4.2	4.3	4.5	4.6	4.7
School	1.7	1.8	1.9	2.0	2.1	2.2
Nonschool	2.4	2.4	2.4	2.5	2.5	2.5
Unemployment	1.6	1.7	1.7	1.7	1.8	1.8

Table I is constructed on seven basic assumptions. It will be noted the part played by the federal government "as an employer," *i.e.*, the size of the armed forces and the size of federal government employment are minimized. This assumption implies a termination of the "cold war" by not later than 1954 with a transformation to a complete peace-time economy beginning about 1955 (the implications of alternate assumptions will be discussed in greater detail below). The basic assumptions underlying Table I are as follows:

1. The total labor force estimates are based on a Bureau of the Census projection.[1]

2. The size of the armed forces is based on the assumption that a peak of some 3.5 to 4.0 millions will be reached in 1954 to be followed by a period of gradual demobilization from 1955 through 1959 reducing the

[1] U. S. Bureau of the Census, *Current Population Reports—Labor Force*, Ser. P-50, No. 42, "A Projected Growth of the Labor Force in the United States under Conditions of High Employment: 1950–1975," Dec. 10, 1952, p. 7; U. S. Bureau of the Census, *Current Population Reports—Population Estimates*, Ser. P-25, No. 58, "Provisional Revision of the Total Population of the United States: July 1, 1953 to 1960," April 17, 1952, p. 1 (see also P-25, No. 43, Aug. 10, 1950, "Illustrative Projections of the Population of the United States 1950 to 1960," p. 11).

total armed forces to a new peace-time high of 1.75 millions.

3. The total civilian labor force is the total labor force minus the armed forces.

4. Total civilian employment is taken as .975 times the total civilian labor force. We will assume a minimum acceptable level of frictional unemployment (U_f) of 2.5 per cent. (This assumption will be discussed more fully below).

5. The projected declines in agricultural employment are based on an extrapolation of the 1900–1950 trend, adjusted to weight the more recent post-World War II experience more heavily.

6. Government employment is estimated in two components:

(a) Federal government civilian employment is based on an annual cross-section analysis of 1945 through 1949 data taken from Fabricant's study.[2] Federal government civilian employment is projected in two components: National defense and non-national defense employment. State and local government is also projected as the sum of two components, nonschool and school employment. Federal national defense activity employment is assumed to be a function of the size of the armed forces assuming the following rate of civilian employees per one thousand men in the armed forces: 1955–1956, 300 civilian employees; 1957–1958, 250 civilian employees; 1959–1960, 175 civilian employees. (In 1947–1949 there were about 348 civilian employees for each 1000 men in the armed forces, in 1937–1939 this ratio was 522 per 1000, and in 1927–1929, 348 per 1000.) Nonnational defense activity civilian employment in 1955 is assumed to be about 10 per cent below the 1947–1949 average; gradual declines are projected thereafter. These declines are assumed to be the product of two factors, the demobilization of the armed forces and related defense efforts and the streamlining of the other nondefense sectors (agencies) of government.

(b) State and local government employment represents a projection of three-decade 1920–1950 trend with an upward adjustment to take into account the levels and composition of the population,[3] particularly the sharp increases in the projected population of primary and secondary school age. Total state and local government employment in 1960 is projected at about 1.4 million above the 1947–1949 average. Nonschool employment is projected at about .5 million above the 1947–1949 average, school employment is projected about .9 million above the 1947–1949 average.

7. Those employed workers who are neither employed in agriculture

[2] Solomon Fabricant, *The Trend of Government Activity in the United States Since 1900* (New York, 1952), Tables B-5 (p. 180), **B-6** (p. 182), B-7 (p. 186), B-13 (p. 196).

[3] See footnote 1.

or in government are assumed to be employed in nonagricultural industries.

Equation I:VI above expressed Gross National Product as the product of the number of workers times the annual output per worker. Once we establish the size and distribution of the labor force we merely require an estimate of the workers' annual output to develop our GNP projections.

We will project "full-employment" levels of Gross National Product ($\overline{GNP}$) as the sum of three components: (1) private nonagricultural GNP (GNP_n); (2) private agricultural GNP (GNP_a); (3) gross government product (GGP); where

$$\overline{GNP} = \overline{GNP_n} + \overline{GNP_a} + \overline{GGP} \qquad \text{(II:I)}$$

and:

$\overline{GNP_n}$, $\overline{GNP_a}$ and $\overline{GGP}$ = that level of product required to maintain that level of employment indicated in Table I.

To arrive at an estimate of the annual output per worker for the private sectors of the economy we require a projection of the workers' productivity and a projection of the average hours worked. The output of the government sectors is, by definition, the compensation of general government employees.

Two productivity projections have been developed, one for the agricultural sector, and one for the nonagricultural sector. Both of these indices are expressed in terms of 1951 constant dollar Gross Private Product per man-hour labor input. They were developed in the following manner. A set of annual estimates for the 1946 through 1951 period were developed based on the employment and hours data from the Bureau of the Census P-50 series and the Gross Private Product and supplemental employment data from the 1951 National Income Supplement of the *Survey of Current Business*. These estimates were then compared with those developed by a more careful cross-section analysis for three years 1949 through 1951 to yield a 1950 "adjusted trend value" for Gross Private Farm Product and Gross Private Nonfarm Product per man-hour labor input (see Table II). (The adjusted trend value is an estimate of the 1950 output per man hour adjusted to take into account an estimate of those changes, which reflect only short-term conditions.)

Gross Private Farm Product per man-hour labor input was then projected through 1960 based on an average of 1950–1960 decade, annual rate of growth of about 2.4 per cent. Gross Private Nonfarm Product per man-hour labor input was projected through 1960 assuming a 2.5 per cent average annual rate of growth.

Recent studies[4] have indicated that Gross Private Farm Product per man-hour labor input has increased at an average annual rate of 1.2 per cent through the four-decade 1909–1941 period. During this same period Gross Private Nonfarm Product per man-hour labor input has

TABLE II.—PROJECTED OUTPUT PER MAN-HOUR, AVERAGE WEEKLY HOURS, AND AVERAGE ANNUAL OUTPUT PER WORKER

	1950[a]	1955	1956	1957	1958	1959	1960
Projected Output per Man-Hour Labor Input							
Gross Private Nonfarm (1951 dollars)	2.67	3.02	3.10	3.17	3.25	3.33	3.42
Gross Private Farm (1951 dollars)	1.39	1.56	1.59	1.63	1.67	1.70	1.74
Projected Average Weekly Hours							
Private Nonagricultural		38.9	38.7	38.5	38.3	38.1	37.9
Private Agricultural		47.5	47.5	47.0	47.0	46.5	46.5
Average Annual Output per Worker							
Nonagricultural (1951 dollars)[b]		6109	6237	6346	6474	6597	6741
Agricultural (1951 dollars)[c]		3853	3927	3994	4081	4111	4207
Government—Federal							
Armed Forces (1951 dollars)[d]		3300	3300	3300	3300	3300	3300
Civilian Government (1951 dollars)[d]		4200	4200	4200	4200	4200	4200
Government—State and Local							
School (1951 dollars)[d]		3500	3500	3500	3500	3500	3500
Nonschool (1951 dollars)[d]		3200	3200	3200	3200	3200	3200

[a] Adjusted trend value.

[b] Average weekly hours (private nonagricultural) times 52 times output per man-hour (gross private nonfarm).

[c] Average weekly hours (private agricultural) times 52 times output per man-hour (gross private farm).

[d] Annual output of government employees is taken as equal to their annual wages and salaries (plus supplements).

increased at an average annual rate of about 1.9 per cent. In the present paper we expect farm productivity to increase at about twice the four-decade pre-World War II rate. This increased rate is expected to be the product of many new technological factors (*i.e.*, the development of new and more efficient farm machinery, increased mechanization, new chemical fertilizers, etc.) and general improvements in farming techniques.

The projected annual increase in nonfarm productivity exceeds the prewar rate through 1960. This increase assumes a continuation of the recent high levels of producers' expenditures for new plant and equipment and a continual improvement in the efficiency of this equipment.

[4] John W. Kendrick, *National Productivity and Its Long-Term Projection*, an unpublished paper presented before the May 1951 National Bureau of Economic Research Conference on Research in Income and Wealth. (See also, George G. Hagedon, *Productivity Gauge of Economic Performance*, National Association of Manufacturers, Econ. Pol. Div. Ser., No. 53, Sept. 1952 [New York, 1952].)

An analysis of preliminary data indicates an average rate of increase in nonfarm productivity of about 3.5 per cent in the postwar 1947–1951 period. While a long-term continuation of this high short-term rate of growth is questionable a continuation of a high-level investment program coupled with the gradual secular shift of workers to the higher productivity industries should assure an above average rate of increase at least through the 1950–1960 decade.

In 1951 agricultural workers averaged a 47.8 hour work week as compared to a 39.6 hour average work for nonagricultural workers.[5] Projected annual average weekly hours through 1960 are given in Table II.

From the projected figures for output per man-hour and for average weekly hours we may develop a set of average annual output per worker estimates by simple multiplication (see Table II).

The annual output of government employees is taken as equal to their annual wages and salaries (plus supplements). Our projections of average annual output per government worker assume a slight improvement in the "average rank" of members of the armed forces and the "average grade" of civilian government employees; that is, we assume that the ratio of "lower rank/grade" employees to "higher rank/grade" employees will decrease. Because of the difficulties involved in projecting changes in constant dollar government product, *i.e.*, shifts in the internal composition (the grade and rank structure) a constant average value is assumed throughout the 1955–1960 period.

We have now developed a set of average annual output estimates for each of the classes of workers in Table I. With the data given in Tables I and II we may now develop a set of "full-employment" estimates of Gross National Product through a simple process of multiplication and summation (see Table III).

The figures for Total Gross National Product in Table III show that level of total demand required to sustain a level of "full employment" consistent with the assumptions noted in Part II. In 1950 Gross National Product (in 1951 constant dollars) stood at 303.3 billion dollars. The next to the last line of Table III shows "full-employment" GNP relative to 1950 = 100.

"Full employment" through the 1955–1960 period would require an average annual rate of growth in aggregate demand of about 3.9 per cent through the 1950–1960 decade. To attain the 374.3 billion dollar level in 1955 would require an average annual rate of growth of about

[5] U. S. Bureau of the Census, *Current Population Reports—Labor Force*, Ser. P-50, No. 40, "Annual Report on the Labor Force 1951," May 19, 1952, Table 10 (p. 24) adjusted for workers "with a job but not at work" Table 2 (p. 16).

TABLE III.—"FULL-EMPLOYMENT" LEVELS OF GROSS NATIONAL PRODUCT

	1955	1956	1957	1958	1959	1960
Nonagriculture—$\overline{GNP}_n$ (1951 billion dollars)[a]	317.7	333.7	347.8	361.2	377.3	391.0
Agriculture—$\overline{GNP}_a$ (1951 billion dollars)[a]	25.0	25.1	25.1	25.3	25.1	25.7
Government—$\overline{GGP}$ (1951 billion dollars)	31.6	29.7	28.3	27.8	26.3	26.7
Federal (1951 billion dollars)	17.7	15.4	13.7	12.8	11.0	11.0
Armed Forces (1951 million dollars)[b]	9900	8250	7425	6600	5775	5775
Civilian Government (1951 million dollars)[b]	7812	7140	6300	6174	5250	5250
State and Local (1951 billion dollars)	13.9	14.3	14.6	15.0	15.3	16.7
School (1951 million dollars)[b]	5950	6300	6650	7000	7350	7700
Nonschool (1951 million dollars)[b]	7680	7680	7680	8000	8000	8000
Total Gross National Product—$\overline{GNP}$ (1951 billion dollars)	374.3	388.5	401.2	414.3	428.7	443.4
$\overline{GNP}$ Relative to 1950=100	123.4	128.1	132.3	136.6	141.3	146.2
Annual Increase (per cent)		3.81	3.28	3.25	3.44	3.47

[a] Average annual output per worker (1951 dollars), taken from Table II, times number of workers employed (millions of workers), taken from Table I.

[b] Average annual earnings per worker (1951 dollars), taken from Table II, times number of workers employed (thousands of workers), taken from Table I.

4.3 per cent between 1950 and 1955. The 443.4 billion level stipulated for 1960 would require slightly less than a 3.5 per cent annual rate of growth during the second half of the decade. Table IV compares these required rates of growth with some selected historical periods.

TABLE IV.—ANNUAL RATES OF GROWTH CONSTANT DOLLAR GROSS NATIONAL PRODUCT[a]

(per cent)

1910–1950	3.0	1946–1950	2.8
1929–1950	2.8	1950–1960	3.9
1939–1950	4.9	1950–1955	4.3
1940–1950	4.5[b]	1955–1960	3.5

[a] All rates are approximate. The 1910–1950 rates are based on the slope of a fitted trend line. The other rates are merely based on the two terminal years only.

[b] If the growth rate is computed based on the 1939, 1940, 1941 and the 1949, 1950, 1951 means, the rate of growth is slightly less, about 4.3 per cent.

Table V compares the projected increases in Gross National Product with the Bureau of the Census revised medium series population projections. From Table V we note that our population is expected to increase by almost 13 per cent over the 1950 level with "full-employment" output increasing about 46 per cent. If "full employment" is to be maintained, Gross National Product per capita will have to increase about

30 per cent over the 1950 level. A 30 per cent increase during the 1950 decade would imply a 2.66 average annual rate of growth (a somewhat smaller average annual rate of growth of 2.47 per cent is implied during the second half of the decade).

A superficial examination of Tables IV and V, would lead to the conclusion that we could expect 1955–1960 to be a period of "full employment" (consistent, with the assumptions developed above) if a rate of growth somewhat greater than the 1910–1950 period but less than the 1939–1950 period could be maintained. In the light of the recent high growth rates (especially the 1950–1952 rate of 5.5 per cent) the 1955–1960 required 3.9 per cent rate of growth seems to appear reasonable. Indeed, even the 4.3 per cent 1950–1955 rate does not seem unreason-

TABLE V.—GROSS NATIONAL PRODUCT PER CAPITA

	GNP (1951 billions)	Population (millions)	GNP per Capita (1951 dollars)	GNP	Population (1950=100)	GNP per Capita
1950	303.3	151.7	1999	100.0	100.0	100.0
1955	374.3	163.2	2294	123.4	107.6	114.7
1956	388.5	164.9	2356	128.1	108.7	117.8
1957	401.2	166.5	2409	132.3	109.8	120.5
1958	414.3	168.1	2464	136.6	110.8	123.2
1959	428.7	169.7	2526	141.3	111.9	126.4
1960	443.4	171.2	2590	146.2	112.8	129.6

able. Table IV, however, does not offer a complete picture. It would be foolhardy to attempt any projection based on recent high growth rates without carefully analyzing the nature of each of the component demands which comprise aggregate demand (GNP). Before we may attempt to measure the feasibility of attaining our required growth rates we must answer a series of related basic and crucial questions. For example: (1) What portion of our recent high levels of aggregate demand represents "one time" nonrecurring demand, and what portion represents demands which might be expected to continue through the 1950–1960 decade? (2) To what extent has the recent high level of government (defense) expenditures directly and indirectly created "a temporary short term upsurge" in Gross National Product? (3) Will there be sufficient private (consumer and business) demand to maintain a high level of Gross National Product when the direct and indirect influences of government spending level off and decrease?

These are only a few of the many questions which must be answered before we can appraise the probabilities of attaining "full employment."

Part III will offer a systematic analysis of the future demand for various Gross National Product components. As we have already noted (page 862) the part played by government both as an "employer" and a "consumer" will be held to a minimum.

III. *The Structure of Demand 1955–1960*

Three sets of demand projections will be developed in this section. The first set of estimates (Variant I) represent projections of the maximum levels of demand we might expect if the high growth rates of the last decade continue. These projections will be developed below in detail. Variants II and III will represent medium and low level demand projections, respectively. These alternate projections will be developed from the Variant I projections by merely changing the basic assumptions underlying their derivation.

It should be emphasized that these demand estimates are not intended as forecasts, but rather as projections of the most probable levels of demand associated with each of the various assumptions noted below.

In Part II we developed a set of estimates of the total output (supply) of the economy under conditions of "full employment." The demand estimates developed below are, in effect, complements of these supply estimates. They are intended to answer the question, "How much can we expect the economy to absorb (demand) during a period of high level economic activity?"

Personal Consumption Expenditures 1955–1960

Projected levels of personal consumption expenditures which we might expect under conditions of high employment (if the consumption trends of the last two decades continue) are based upon (a) projected levels of per capita consumption, showing an improvement in the standard of living, and (b) projected increases in the population. Per capita personal consumption expenditure rates have been projected on the basis of a time series analysis of the personal consumption expenditure data contained in Table XXX of the National Income Supplement of the *Survey of Current Business*.[6] For the purpose of analysis each of the 178 categories of consumption expenditure listed in that table have been aggregated into ten broad consumption classifications, as shown in Table VI.[7]

[6] U. S. Department of Commerce, Office of Business Economics, *National Income and Product of the United States 1929–1950* (Washington, 1951), pp. 192–99. (See also, *Survey of Current Business*, July 1952, pp. 24–25.

[7] Of the 178 items listed in Table XXX of the National Income Supplement, 53 are included in the first nine classifications, and account for almost 92 per cent of total personal consumption expenditures. The remaining 125 items are included in a tenth, residual classification, "Other Consumption." "Food I" includes food purchased for off-premise consumption, and food produced and consumed on farms. "Food II" includes purchased meals and beverages,

TABLE VI.—PERSONAL CONSUMPTION EXPENDITURES BY CONSUMPTION COMPONENT
(1951 dollars per capita)

	Actual	Projected					
	1951	1955	1956	1957	1958	1959	1960
Food I	350	381	390	398	406	415	423
Food II	98	130	135	140	145	151	157
Clothing	129	158	161	164	167	170	173
Housing	137	152	158	164	171	177	184
Fuel, Power and Light	46	51	52	53	54	56	57
Housefurnishings	53	65	67	69	70	72	74
Miscellaneous I	188	210	215	220	225	231	236
Miscellaneous II	114	123	125	128	130	132	134
Supernumerary Durables	120	160	168	176	184	193	202
Other Consumption	112	120	123	125	127	130	132
Total	1347	1550	1594	1637	1679	1727	1772

Consumption expenditures for each of the ten classifications were computed annually from 1929 through 1951. These current dollar series were then adjusted to take into account changes in the price level and our increasing population, and an exponential trend ($Y_c = ab^x$) was fitted to each of the constant dollar per capita consumption series.[8] Table VI

and food furnished government and commercial employees. "Miscellaneous I" includes tobacco products and smoking supplies, toilet articles and preparations, lighting supplies, cleaning and polishing preparations, miscellaneous household paper products, telephone, postage, drug preparations and sundries, physicians and dentists, privately controlled hospitals and sanitariums, purchased local transportation (less taxicab fares), gasoline and oil, automobile insurance (net payments), motion pictures, magazines, newspapers, etc., and religious and welfare activities. "Miscellaneous II" includes cleaning, dyeing, pressing, etc., laundering in establishments, barber shop services, beauty parlor services, baths and masseurs, total personal business expenditures, automobile repair, greasing, etc., nondurable toys and sport supplies, and private education and research. "Supernumerary Durables" include such items as jewelry and watches, refrigerators, washing and sewing machines, miscellaneous electrical appliances, radio and television receivers, new cars and net purchases of used cars.

[8] The resulting trend equations are as follows:

Food I	$Y_c = 227\ (1.0211)^x$	III:I
Food II	$Y_c = 49\ (1.0384)^x$	III:II
Clothing	$Y_c = 99\ (1.0182)^x$	III:III
Housing	$Y_c = 87\ (1.0385)^x$	III:IV
Fuel, Power and Light	$Y_c = 27\ (1.0242)^x$	III:V
Housefurnishings	$Y_c = 33\ (1.0254)^x$	III:VI
Miscellaneous I	$Y_c = 114\ (1.0240)^x$	III:VII
Miscellaneous II	$Y_c = 79\ (1.0175)^x$	III:VIII
Supernumerary Durables	$Y_c = 48\ (1.0473)^x$	III:IX
Other Consumption	$Y_c = 71\ (1.0184)^x$	III:X

where Y_c = the trend value of per capita constant dollar consumption
X = the year minus 1929 (the year minus 1939 for equation III:IV)

All of the above equations with the exception of equation III:IV are fitted to 1929–1951 data. Equation III:IV is fitted to 1939–1951 data. Equations III:I and III:VIII have been adjusted to allow greater weight to post 1939 consumption trends.

presents a set of per capita consumption projections generated from the ten trend equations. It should be emphasized that these projections are not intended as forecasts, but rather as estimates of the per capita levels of consumption we might expect in a period of "high level employment," if the consumption trends established above continue.

The per capita consumption estimates, Table VI, may be converted to annual expenditure estimates by merely multiplying each per capita estimate by an appropriate population estimate. Table VII shows the

TABLE VII.—PERSONAL CONSUMPTION EXPENDITURES BY CONSUMPTION COMPONENT

(billions of 1951 dollars)

	Actual	Projected					
	1951	1955	1956	1957	1958	1959	1960
Food I	54.0	62.2	64.3	66.3	68.2	70.4	72.4
Food II	15.1	21.2	22.3	23.3	24.4	25.6	26.9
Clothing	19.9	25.8	26.5	27.3	28.1	28.8	29.6
Housing	21.2	24.8	26.1	27.3	28.7	30.0	31.5
Fuel, Power and Light	7.1	8.3	8.6	8.8	9.1	9.5	9.8
Housefurnishings	8.2	10.6	11.0	11.5	11.8	12.2	12.7
Miscellaneous I	29.1	34.3	35.4	36.6	37.8	29.2	40.4
Miscellaneous II	17.7	20.1	20.6	21.3	21.9	22.4	22.9
Supernumerary Durables	18.6	26.1	27.7	29.3	30.9	32.8	34.6
Other Consumption	17.2	19.6	20.3	20.8	21.3	22.1	22.6
Total	208.1	253.0	262.8	272.5	282.2	293.0	303.4

annual expenditure equivalent of Table VI (per capita consumption times the appropriate Bureau of the Census revised medium series population projection, see Table V).

The Demand for Private Residential Construction, 1955–1960

Table VIII shows the development of total nonfarm housing needs from 1955 through 1960. The data used in this table are based on the 1950 Census of Housing.[9] The total potential housing need during the 1955–1960 period is estimated at 7200 thousand housing units.

Although the annual levels of residential construction can be expected to fluctuate from year to year, we will simply assume one-sixth of the 7,200,000 required units will be constructed annually through the six-year period.

To convert the housing unit estimates into "dollar value of the construction" estimates we assume that the price of an "average housing unit" will be 9300 constant (1951) dollars. This average price estimate assumes that the 1955–1960 cost of an "average housing unit" will be

[9] U. S. Bureau of the Census, 1950 Census Population and Housing, *Housing* Vol. I, *General Characteristics*, "Part I," (Washington, 1953). See also footnote 11.

TABLE VIII.—TOTAL POTENTIAL NONFARM HOUSING NEEDS 1955–1960
(thousands of housing units)

Household Formation, March 1950–July 1960	7,270
Replacement Needs:	
Dilapidated Units in Use, 1950	2,500
One Third of the Units Which Will Become Dilapidated during the Decade	470
Losses from Disaster	250
Removal of Temporary Public Housing	600
Removal of Three Quarters of the Marginal Dwelling Units Added during the 1940's	520
Reconversion of One Third of the Apartment Conversions Added in the 1940's	600
Requirement to Establish a 4 per cent Vacancy Ratio for Rent or Sale	990
Total Potential Housing Needs 1950–1960	13,200
Less: Estimated Housing Starts 1950–1954	6,000
Total Potential Housing Needs 1955–1960	7,200

about five per cent lower than that of an "average housing unit" during the 1950–52 period. Since this average cost is expressed in 1951 dollars the projected decrease reflects an anticipated change in the "product mix" of the average, *i.e.*, a trend toward fewer high-price and greater low-price units. Table IX shows the derivation of the annual average nonfarm construction estimate for the 1955–1960 period.

TABLE IX.—AVERAGE ANNUAL EXPENDITURES FOR NONFARM RESIDENTIAL CONSTRUCTION 1955–1960

Total Potential Housing Needs 1955–1960	7,200,000 housing units
Average Annual Potential Housing Needs 1955–1960 (7,200,000/6)	1,200,000 housing units
Estimated Average Cost per Unit	9,300 1951 dollars
Average Annual Expenditure for Nonfarm Residential Construction [(1,200,000) (9,300)]	11.2 1951 billions

In addition to the estimated 11.2 billion dollar outlays for new nonfarm residential construction we can expect about another 1.0 billion dollars a year will be spent on additions and alterations of existing units. Farm residential construction is estimated at about 800 million dollars a year. Table X shows the average annual expenditures for residential construction through the 1955–1960 period.

TABLE X.—AVERAGE ANNUAL EXPENDITURES FOR RESIDENTIAL CONSTRUCTION 1955–1960
(1951 billions)

Nonfarm Residential Construction	11.2
Additions and Alterations	1.0
Farm Residential Construction	.8
Total Residential Construction	13.0

Producers' Durable Equipment and Nonresidential Construction 1955–1960

If the recent past trends in the interrelationship between (a) productivity and the stock of producers' durable equipment per worker, and (b) the stock of nonresidential construction and the stock of producers' durable equipment continue through the 1960 decade we may expect a high level of investment through the 1955–1960 period. Table XI shows the projected demand for producers' durable equipment and nonresidential construction.

TABLE XI.—THE DEMAND FOR PRODUCERS' DURABLE EQUIPMENT AND NONRESIDENTIAL CONSTRUCTION 1955–1960

(1951 billions)

	Producer's Durable Equipment	Nonresidential Construction	Total
1955	29.5	11.8	41.3
1956	34.3	13.3	47.6
1957	34.2	13.0	47.2
1958	35.6	13.5	49.1
1959	39.2	14.1	53.3
1960	40.7	14.1	54.8

The estimates in Table XI were developed in the following manner. A set of estimates of the stock of nonresidential construction and producers' durable equipment through the 1929–1952 period was derived through the use of a perpetual inventory method[10] assuming a forty-year straight line economic life for nonresidential construction and a fifteen-year straight line economic life for producers' durable equipment. The interrelationship between productivity and the stock of producers' durable equipment per worker (excluding government workers) was determined by fitting the simple linear regression equation,

$$P = a + b \cdot S/W \qquad \text{III:XI}$$

where:

P = productivity, in terms of constant dollar Gross Private Product per man-hour labor input
S = the stock of producers durable equipment
W = the number of private (nongovernment) workers
a and b are regression coefficients,

to ten annual observations covering the 1939–1941, 1946–1952 periods. A simple least-squares technique yielded the following results:

[10] Raymond W. Goldsmith, "A Perpetual Inventory of National Wealth," *Studies in Income and Wealth*, Vol. XIV, National Bureau of Economic Research (New York, 1952), pp. 6–73, especially pp. 14–17.

$$P = 1.16 + .000531927\ S/W \qquad \text{III:XII}$$

$$(r = .9840,\ r^2 = .9683,\ S_y = .049)$$

Given a productivity projection, equation III:XII may be solved for S/W to estimate the stock of producers' durable equipment required per worker to maintain the stipulated level of productivity.

$$S/W = \frac{P - 1.16}{.000531927} \qquad \text{III:XIII}$$

If we substitute a weighted average (weighted by the total hours worked) of the productivity projections given in Table II above into equation III:XIII, we may develop a projection of the stock of producers' durable equipment per worker required to maintain the secular increase in productivity projected in Part II (see Table XII). To arrive

TABLE XII.—THE ANNUAL DEMAND FOR PRODUCERS' DURABLE EQUIPMENT 1955–1960

	1955	1956	1957	1958	1959	1960
Gross Private Product per Man-Hour Labor Input (1951 dollars)	2.83	2.91	2.98	3.06	3.14	3.23
Stock of Producers' Durable Equipment per Worker[a] (1951 dollars)	3140	3290	3422	3572	3722	3892
Projected Number of Nongovernment Workers[b] (millions)	58.5	59.9	61.1	62.0	63.3	64.1
Total Stock of Producers' Durable Equipment (1951 billions)	183.7	197.1	209.1	221.3	235.5	249.3
Net Annual Expansion Requirement (1951 billions)	9.9	13.4	12.0	12.2	14.2	13.8
Replacement Requirement—Pre-1953 Equipment (1951 billions)	15.9	15.2	14.2	13.1	12.3	11.6
Replacement Requirement—Post-1953 Equipment (1951 billions)	3.7	5.7	8.0	10.3	12.7	15.3
Total Requirement (1951 billions)	29.5	34.3	34.2	35.6	39.2	40.7

[a] From equation III:XIII.
[b] From Table I.

at an estimate of the total stock of producers' durable equipment required we merely multiply the projected per worker requirements by a projection of the number of nongovernment workers.

The total demand for producers' durable equipment is equal to the net annual requirement (for expansion) plus the "depreciation" accrued on the already existing stock of equipment (for replacement). Table XII shows the projected annual demand for producers' durable equipment based on the net annual requirements shown above and a fifteen-year straight line economic life depreciation assumption. (Note: The pre-

1953 replacement requirement represents an uncentered fifteen-year moving average of constant dollar expenditures for producers' durable equipment. The post-1953 requirement represents one-fifteenth of cumulated expenditures beginning with 1953.)

Throughout the postwar (1947–1952) period a high correlation was observed between the total stock of producers' durable equipment and the total stock of nonresidential construction. This interrelationship is best described by the simple regression equation.

$$C = a + b\,S \qquad \text{III:XIV}$$

where:

C = total stock of non-residential construction
S = total stock of producers' durable equipment
a and b are regression coefficients

If we apply a simple "least squares technique" to six annual postwar observations (1947–1952) equation III:XIV becomes,

$$C = 93.185 + .3959\,S \qquad \text{III:XV}$$

$$(r = .9935,\ r^2 = .9870,\ S_y = .698)$$

From equation III:XV we can, given a projection of the stock of producers' durable equipment, estimate the required stock of nonresidental construction. Table XIII shows the stock of nonresidential construction required (from equation III:XV) to support the stock of producers' durable equipment indicated in Table XII, and also shows

TABLE XIII.—THE ANNUAL DEMAND FOR NONRESIDENTIAL CONSTRUCTION 1955–1960

(1951 billions)

	1955	1956	1957	1958	1959	1960
Stock of Nonresidential Construction[a]	165.9	171.2	176.0	180.8	186.4	191.9
Net Annual Expansion Requirement	3.9	5.3	4.8	4.8	5.6	5.5
Replacement Requirement (Pre-1953 Construction)	7.3	7.1	7.0	6.8	6.7	6.5
Replacement Requirement (Post-1953 Construction)	.6	.9	1.2	1.5	1.8	2.1
Total Requirement	11.8	13.3	13.0	13.5	14.1	14.1

[a] Obtained by substituting the stock of producers' durable equipment projected from Table XII into equation XI:XV.

the projected annual demand for nonresidential construction on the basis of these requirements together with a replacement requirement based on a forty-year straight line economic life depreciation assumption.

Business Demand for Inventories 1955–1960

The projected demand for inventories (the net change in business inventories) represents the first differences of a total inventory series developed by substituting the projected values of Gross National Product (Table III) into a simple regression equation describing the 1947–1952 interrelationship between total business inventories and Gross National Product (see Table XIV).

TABLE XIV.—NET CHANGE IN BUSINESS INVENTORIES 1955–1960

(1951 billions)

1955	+2.7	1958	+2.7
1956	+2.8	1959	+2.8
1957	+2.5	1960	+3.0

Net Foreign Investment 1955–1960

Our projections of the level of net foreign investment (Table XV) merely represent a consensus of the most recent available "expert opinion." They reflect the impact of the assumed gradual curtailment of government foreign aid spending (as indicated under the government demand sections of this paper).

TABLE XV.—NET FOREIGN INVESTMENT 1955–1960

(1951 billions)

1955	1.0	1958	1.7
1956	1.3	1959	1.9
1957	1.5	1960	2.0

The Demand of the Federal Government 1955–1960

Estimates of the demand of the federal government from 1955 through 1960 have been projected in two broad components, wages and salaries of government workers, and purchases from business (see Table XVI). The wages and salaries projections are taken from Table III. Federal government purchases from business are projected in three categories: national defense, other national security, other nondefense expenditures.

National defense purchases from business are based on the assumption that the average expenditure per member of the armed forces will be about 25 per cent higher than it was during the 1947–1950 period. The 1947–1950 period average (3970 1951 dollars) was developed by dividing national defense expenditures minus the sum of the payrolls of the armed forces plus the payrolls of the civilian employees of defense activities by the number of members of the armed forces. Other federal

TABLE XVI.—GOVERNMENT PURCHASES OF GOODS AND SERVICES 1955–1960

(1951 billions)

	1955	1956	1957	1958	1959	1960
Demand of the Federal Government	40.4	35.0	31.3	28.8	24.9	24.9
Wages and Salaries	17.7	15.4	13.7	12.8	11.0	11.0
Purchases from Business	22.7	19.6	17.6	16.0	13.9	13.9
National Defense	14.9	12.4	10.9	9.9	8.4	8.4
Other National Security	3.0	2.5	2.0	1.5	1.0	1.0
Other Nondefense	4.8	4.7	4.7	4.6	4.5	4.5
Demand of State and Local Governments	35.2	36.7	37.2	37.8	38.2	36.4
Wages and Salaries[a]	13.9	14.3	14.6	15.0	15.3	15.7
Purchases from Business[b]	5.3	5.4	5.6	5.8	5.9	6.1
Public Works	16.0	17.0	17.0	17.0	17.0	14.6
Schools	2.5	2.5	2.5	2.5	2.5	2.5
Hospitals	2.2	2.5	2.5	2.5	2.5	1.8
Highways and Other	11.3	12.0	12.0	12.0	12.0	10.3
Total Government Purchases	75.6	71.7	68.5	66.6	63.1	61.3

[a] State and local government product, Table III.

[b] Based on an assumed annual expenditure per worker of $1,250 in 1955 and an annual increase of $10 each year thereafter.

government purchases from business are projected on the assumption that they will be 15 per cent lower per general nondefense civilian worker than they were during the 1947–1950 period.

The Demand of State and Local Governments 1955–1960

Table XVI also shows the projected demand of state and local governments through the 1955–1960 period. The demand for personal services (wages and salaries) is taken from Table III. Purchases from business are based on the annual expenditures per state and local government worker during the 1946–1951 period adjusted to take into account a gradual secular "improvement" in the services provided by government. The projected expenditures for public works are extremely high and are without historical precedent. They are based on the estimates contained in *The Sustaining Economic Forces Ahead*,[11] assuming the "demand" for public works will be almost completely fulfilled during the 1950–1960 decade.

Table XVII summarizes the demand projections developed in Tables VI through XVI. The Variant I estimates assume a continuation of the recent high growth rates considered in detail in the preceding sections. Our Variant II and Variant III demand projections merely assume an

[11] Joint Committee on the Economic Report, *The Sustaining Economic Forces Ahead* (Washington, 1952), pp. 34–59. (See also, Federal Reserve Bank of Chicago, *Business Conditions*, Jan. 1953, pp. 12–15.)

across-the-board decline in the over-all growth rate, to a rate three-quarters, and one-half, the Variant I rate, respectively.

TABLE XVII.—THE STRUCTURE OF DEMAND 1955–1960

(billions of 1951 dollars)

	1955	1956	1957	1958	1959	1960
Variant I						
Personal Consumption Expenditures	253.0	262.8	272.8	282.2	293.0	303.4
Residential Construction	13.0	13.0	13.0	13.0	13.0	13.0
Producers' Durable Equipment	29.5	34.3	34.2	35.6	39.2	40.7
Nonresidential Construction	11.8	13.3	13.0	13.5	14.1	14.1
Net Change in Business Inventories	2.7	2.8	2.5	2.7	2.8	3.0
Net Foreign Investment	1.0	1.3	1.5	1.7	1.9	2.0
Government Purchases of Goods and Services	75.6	71.7	68.5	66.6	63.1	61.3
Total Demand	386.6	399.2	405.5	415.3	427.1	437.5
Variant II—Total Demand	372.3	381.4	385.9	392.9	401.3	408.6
Variant III—Total Demand	357.8	363.6	366.5	370.9	376.2	380.8

IV. *"Full Employment" 1955–1960*

This section will compare the "supply" projections developed in Part II with the "demand" projections developed in Part III. The supply estimates were based on a 97.5 per cent employment assumption; that is to say, they represent a projection of the levels of output required to provide employment for 97.5 per cent of the total civilian labor force. Frictional unemployment has been taken as 2.5 per cent. The 2.5 per cent level is somewhat arbitrary: it is based on consideration of the factors listed in *Employment and Unemployment.*[12]

TABLE XVIII.—EXCESS (+) OR DEFICIT (−) SUPPLY OVER DEMAND 1955–1960

(billions of 1951 dollars)

	Variant I Demand	Variant II Demand	Variant III Demand
1955	−12.3	+ 2.0	+10.5
1956	−10.7	+ 7.1	+24.9
1957	− 4.3	+15.3	+34.7
1958	− 1.0	+21.4	+43.4
1959	+ 1.6	+27.4	+52.5
1960	+ 5.9	+34.8	+62.6

We are now concerned with determining the "actual" levels of unemployment implicit to each of our three demand variants. Table XVIII

[12] Joint Committee on the Economic Report, *Employment and Unemployment* (Washington, 1950), pp. 56–97. (See also, A. J. Jaffe and C. D. Stewart, *Manpower Resources and Utilization* [New York, 1951], pp. 78–85, 477–84.)

compares each of the three "demand" variants with the "full-employment supply" estimates shown in Table III.

In the present model, the interrelationship between supply (S), demand (D) and the employment ratio (E_R) may be defined as follows: When

$$S \equiv D, \quad E_R \equiv .975 \qquad \text{(IV:IA)}$$

$$S < D, \quad E_R > .975 \qquad \text{(IV:IB)}$$

$$S > D, \quad E_R < .975 \qquad \text{(IV:IC)}$$

To determine the "actual" level of unemployment associated with each of the three demand variants we must convert the excesses and deficits shown in Table XVIII to an employment equivalent. That is to say, we must "cost out" the employment equivalent of one billion dollars of demand. Once we have determined the average annual output per worker (Z_A), one billion dollars worth of employment (E_B) becomes,

$$E_B = \frac{1 \text{ Billion Dollars}}{Z_A} \qquad \text{IV:II}$$

The average annual output per worker, for agricultural and nonagricultural workers, was shown in Table II; Table XIX shows the average annual output per *average* (weighted average of agricultural and nonagricultural workers) worker and the associated value of E_B for the 1955–1960 period.

TABLE XIX.—AVERAGE ANNUAL OUTPUT PER WORKER AND EMPLOYMENT 1955–1960

	Average Annual Output per Worker(Z_A) (1951 dollars)	Employment per Billion Dollars of Demand (E_B) (thousands of workers)
1955	5872	170.3
1956	5992	166.9
1957	6106	163.8
1958	6236	160.4
1959	6352	157.4
1960	6499	153.9

Once we have established values for E_B we may convert the dollar estimates, Table XVIII, into "employment equivalents." Table XX shows the "employment equivalents" of the excess or deficit demand of Table XVIII. Table XX also shows the total unemployment (by combining the employment equivalents of the excess or deficit demand with the minimum frictional unemployment assumed in the construction of

TABLE XX.—THE EFFECT OF EXCESS (+) OR DEFICIT (−) DEMAND ON EMPLOYMENT 1955–1956

	1955	1956	1957	1958	1959	1960
Employment Equivalents of Excess or Deficit Demand Shown in Table XVIII						
Variant I Demand (million workers)	+2.1	+1.8	+ .7	+ .2	− .3	− .9
Variant II Demand (million workers)	− .3	−1.2	−2.5	−3.4	−4.3	−5.3
Variant III Demand (million workers)	−2.8	−4.2	−5.7	−7.0	−8.3	−9.6
Minimum Frictional Unemployment[a] (million workers)	1.6	1.7	1.7	1.7	1.8	1.8
Unemployment						
Variant I Demand (million workers)	—[b]	—[b]	1.0	1.5	2.1	2.7
Variant II Demand (million workers)	1.9	2.9	4.2	5.1	6.1	7.1
Variant III Demand (million workers)	4.4	5.9	7.4	8.7	10.1	11.4
Unemployment as Percentage of Total Civilian Labor Force						
Variant I Demand (per cent)	− .8	− .1	1.5	2.2	3.0	3.8
Variant II Demand (per cent)	2.9	4.3	6.1	7.3	8.6	9.9
Variant III Demand (per cent)	6.7	8.7	10.8	12.5	14.2	15.9

[a] From Table I.

[b] Under the Variant I Demand assumption employment falls below the frictional unemployment minimum.

Table I) associated with each demand variant. Unemployment as a percentage of the total civilian labor force is also shown with respect to each demand variant.

It will be noted that under the Variant I demand assumptions unemployment fell below the assumed frictional minimum from 1955 through 1958, *i.e.*, demand exceeded supply. Under the Variant III demand assumptions unemployment is projected at a maximum, reaching a peak of 11.4 millions in 1960.

If we are to have "full employment" through the 1955–1960 period we must adjust "supply" to a level where "supply" is just equal to demand. Supply (S) may be expressed as a function of three factors, productivity (P) in terms of constant dollar output per worker per man-hour labor input, the number of workers (E), and the average weekly hours worked (H).

$$S = (E)(P)[(H)(52)] \qquad \text{IV:III}$$

The level of employment (E) is stipulated, *i.e.*, 97.5 per cent of the total labor force; we have assumed productivity (P) as a semi-independent function of time; any adjustments in the levels of supply, therefore, must be made by adjusting the length of the work week. When "demand" exceeds "supply" the work week must be lengthened, when "supply" exceeds "demand" it must be shortened.

To determine how much the work week must be changed we must

"cost out" the dollar value of "one hour's worth of employment." "One hour's worth of employment" may be defined by the equation

$$H_E = (P)(E) \qquad \text{IV:IV}$$

where

H_E = the dollar value of "one hour's worth of employment"
P = productivity, constant dollar output per worker per man hour labor input
E = the number of workers employed.

Table XXI shows the value of "one hour's worth of employment" from 1955 through 1960; this was determined by merely substituting the pertinent data from Tables I and XII into equation IV:IV. "One hour's worth of employment" is then converted into the hours required to produce "one billion dollars worth of supply." To determine the changes in working hours required to adjust "supply" to a level where the latter is just equal to "demand," we merely multiply the excesses and deficits shown in Table XVIII by the hours required to produce "one billion dollars worth of supply."

TABLE XXI.—WORKING HOURS REQUIRED TO MAINTAIN "FULL EMPLOYMENT"

	1955	1956	1957	1958	1959	1960
"One Hour's Worth of Employment" (millions of 1951 dollars)	182.5	191.5	199.4	207.8	217.0	226.1
Hours Required to Produce "One Billion Dollars Worth of Supply"	5.48	5.22	5.01	4.81	4.61	4.42
Changes in Average Anual Working Hours Required to Maintain "Full Employment"						
Variant I Demand	+67.4	+ 55.9	+ 21.5	+ 4.8	− 7.4	− 26.1
Variant II Demand	−11.0	− 37.1	− 76.6	−102.9	−126.3	−153.8
Variant III Demand	−90.4	−130.0	−173.8	−208.8	−242.0	−276.7
Changes in Average Weekly Working Hours Required to Maintain "Full Employment"						
Variant I Demand	+1.3	+1.1	+ .4	+ .1	− .1	− .5
Variant II Demand	− .2	− .7	−1.5	−2.0	−2.4	−3.0
Variant III Demand	−1.7	−2.5	−3.3	−4.0	−4.6	−5.3
Average Weekly Working Hours Required to Maintain "Full Employment"						
Initial Supply	39.9	39.6	39.4	39.2	38.9	38.7
Variant I Demand	41.2	40.7	39.8	39.3	38.8	38.2
Variant II Demand	39.7	38.9	38.3	37.3	36.4	35.2
Variant III Demand	38.2	37.1	36.1	35.2	34.3	33.4

From an analysis of Tables XVIII through XXI the possibility of maintaining "full employment" through the 1955–1960 period seems reasonable. Under the Variant I and II demand assumptions only a minor adjustment in the length of the average work week would be required to equate "supply" with "demand." The last four lines of Table XXI compare the average work week implicit in our initial supply projections with the average work week required to maintain "supply-demand equilibrium" under each of the three demand assumptions.

Under the Variant I and II demand assumptions the weekly hours are fairly reasonable, the maximum adjustment required being only three hours (Variant II, 1960). This adjustment may be accomplished in two ways: the average work week could be adjusted as shown, or the average length of vacations could be increased. For example, if the labor force works an average work week of 38.7 hours and a 35.2 work week is required to maintain "supply-demand equilibrium," the average worker is required not to work (be on vacation) 4.7 weeks a year.[13] Or some shortening of the average work week could be combined with a somewhat shorter vacation. For example, with an average work week of 36.7 hours the vacation would need to be 2.1 weeks; with an average work week of 36.2 hours the vacation would need to be 1.4 weeks. Such adjustments seem not at all unreasonable. However, under the Variant III demand assumptions it would be difficult, if not impossible, to balance supply with demand without drastically reducing the work week (or unreasonably increasing the length of the vacation period).

Thus far we have assumed a rather high goal (97.5 per cent) in defining "full employment." If we were willing to accept a lower employment rate, or its complement, a higher unemployment rate, "full employment" might be attained with a lower level of demand than that specified in the tables above. Table XXII shows the "demand deficits" acceptable if we define "full employment" with a lower employment rate.

If we define "full employment" at a 95.0 per cent level rather than the 97.5 per cent level assumed above we may attain "full employment" with a level of demand from 9.7 to 11.7 billion dollars below that required at the 97.5 per cent level. A 94.0 per cent "full employment" assumption would allow a deficit (below the 97.5 per cent, demand requirements) of from 13.6 to 16.3 billion dollars.

[13] A 35.2 hour work week adds up to 1830.4 hours a year (without vacation), while at 38.7 hour work week adds up to 2012.4 hours. The difference, 182 hours, is 4.7 weeks (for a 38.7 hour week). It is obvious that the three hour adjustment may not be accomplished by merely lengthening the vacation period.

TABLE XXII.—DEMAND DEFICITS IMPLICIT IN SELECTED EMPLOYMENT RATES, 1955–1960

Employment Rate (per cent)	Demand Deficit (billions of 1951 dollars)					
	1955	1956	1957	1958	1959	1960
97.5	0.0	0.0	0.0	0.0	0.0	0.0
97.0	1.9	2.0	2.1	2.2	2.3	2.3
96.5	3.9	4.0	4.2	4.3	4.5	4.7
96.0	5.8	6.1	6.3	6.5	6.8	7.0
95.5	7.8	8.1	8.4	8.7	9.0	9.3
95.0	9.7	10.1	10.5	10.9	11.3	11.7
94.5	11.6	12.1	12.6	13.0	13.5	14.0
94.0	13.6	14.2	14.7	15.2	15.8	16.3

From the above analysis the following conclusions are evident:

1. The maintenance of a high level of employment (in the neighborhood of 97.5 per cent of the total labor force) through the 1955–1960 period would require a continuation of the relatively high growth rates (in demand) of the last decade.

2. A future high level of employment is possible within the present framework of the economy (Variant I and II demand estimates).

3. A high level of employment appears possible without a high level of federal government spending.

4. Four strategic areas of demand, nonresidential construction, producers' durable equipment, consumer supernumerary durables, and state and local government public works will have to be maintained at high levels almost without historical precedent.

5. The over-all economic adjustments required to attain "full employment" appear reasonable.

On the whole, if economic stability is maintained, and the long-term growth rates in the standard of living, productivity, and capital formation continue, we may reasonably expect the last half of the 1950–1960 decade to be a period of "full employment."

COMMUNICATIONS

Additional American Reprints of Economic Writings 1776-1848

To three correspondents I am indebted for eleven titles, additional to those published in the *American Economic Review* for December, 1952. Two of them are earlier than 1776. Professor Fetter of Northwestern University has called my attention to a printing of the *Bullion Report* (1810) in the *Financial Register of the United States* in the issues of July 5 and 19, 1837 and to its issue between "hard covers" in 1874. To this evidence of interest in banking, the lack of which I found so puzzling, may be added Cobbett's *Paper against Gold* contributed, with most of the other titles, by Mr. Salkolski of *The Commercial and Financial Chronicle*. It may not be fanciful to assume that a date as late as 1874 for the printing of the *Bullion Report* shows a professional concern in the development of theory; just as continuing reissues of Say's *Treatise* and Marcet's *Conversations*, a number of which Professor Jennings of Wheaton College has noted in Hollander's catalogue, give evidence of the growth of economics as a teaching subject. I have arranged the titles chronologically and append them. My correspondents are responsible for all except the original dates of publication.

May I take this opportunity to point out the error of note** in my original article (p. 880). Jefferson did not translate but extensively revised Destutt de Tracy's work on political economy (*ibid.*, p. 877).

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	Original Publication	*American Printing*
ROUSSEAU, J. J., *Économie politique* in Diderot's *Encyclopédie*, Vol. V	1755	*Political economy to which is added a treatise on the social contract.* Albany, 1797
FERGUSON, A., *An essay on the history of civil society*	1767	Boston, 1810
BENTHAM, J. A., *Defence of usury*	1787	Philadelphia, 1796 (This precedes the two entries, both of 1837, included in my earlier article, p. 879
TALLEYRAND, C. M. DE, *Memoir concerning the commercial relations of the United States with England*	1806	Boston, 1809
COBBETT, WM., *Paper against gold*	1810	New York, 1846
JACOB, WM., *An historical inquiry into the production and consumption of the precious metals*	1831	Philadelphia, 1832
CHALMERS, T., *On Political Economy*	1832	New York, 1832

SCROPE, G. POULETT, *Principles of political economy*	1833	*Political economy* (adapted by POTTER, A.). New York, 1840
ATKINSON, WM., *Principles of political economy*	1840	New York, 1843
KNIGHT, C., *Store of knowledge*. This contains PLATT, J. C., *History of the British Corn Laws*.	1841	Hunt's Library of Commerce, 1845. Contains Platt's history and other English works.
Memoirs and correspondence of Francis Horner, M.P., published by his brother.	1843	Boston, 1853

Welfare Comparisons and Changes in Tastes

It has frequently been noted that the "new welfare economics" operates on the working assumption that tastes do not change, or alternatively, that if they change, welfare comparisons are meaningless. This assumption has of course been given explicit attention in index number theory and in welfare theory proper, but it has not until quite lately received much emphasis in the recent upsurge of interest in welfare economics associated with such names as Arrow, Little, Samuelson, Baumol and Scitovsky.

The recent review by I.M.D. Little of Arrow's *Social Choice and Individual Values*[1] brings the assumption into relief by relating it to Arrow's pioneer work. And more recently, Sidney Schoeffler in an interesting paper,[2] whose point of departure is also Arrow's book, examines the whole question of changes in tastes and the ability to make welfare judgments. In addition, he advances two methods by which welfare judgments might be made in a setting in which individual tastes change, and frequently.

My major purpose is to offer a modification of one of Schoeffler's suggested comparison methods in a way which I think might justifiably increase the frequency of unambiguous responses rendered by it.

The framework within which Schoeffler advances his suggestions may be briefly sketched. Consider an individual at two periods of time. At t_0 the social state (the matrix showing the distribution of all goods and services, the political situation, the social welfare function, etc.) is A, at t_1 it is B. If the individual's tastes are unchanged, he can say with consistency both at t_0 and t_1 whether he prefers A to B, B to A, or is indifferent between them. He therefore can say at t_1 whether or not he is better off than at t_0; and his answer will be the same as when he is asked at t_0 where he would be better off (*i.e.*, if B were expected to exist at t_1).

Similarly, every other individual in the community can be conceived of as capable of making the same comparison. On the basis of these individual comparisons, it is possible to conceive of a social comparison which "reflects" these individual comparisons.[3] On the basis of the rule for deriving the social

[1] *Jour. Pol. Econ.*, Oct. 1952, LX, 422-32.

[2] "Note on Modern Welfare Economics," *Am. Econ. Rev.*, Dec. 1952, XLII, 880-87.

[3] Neglecting Arrow's "Possibility Theorem" which states that if the social comparisons are asked to fulfill certain apparently reasonable conditions of correspondence with the individual comparisons, then no method of arriving at such social comparisons exists.

from the individual comparisons, we can say that society at t_1 is better off than, worse off than, or as well off as, at t_0.

But this last comparison and all the comparisons on which it is based depend on the tastes of the various individuals being unchanged at the two moments in time. If tastes change, then some individual might well say at t_1 that he prefers B to A while at t_0 say that he prefers A to B. Which statement is correct? The economist claims to be unable to find out. He characterizes the comparisons as meaningless—thus, Schoeffler says, "It is meaningless . . . for the reader to ask himself whether he is more or less happy now than he was at four years old."[4] And the social comparisons based on the individual comparisons he similarly characterizes as meaningless.

We may summarize the above using the terminology of social welfare functions: Expressing tastes solely in terms of individual orderings[5] of the alternative social states, the social welfare function is a rule by which we derive a social ordering corresponding to each set of individual orderings. The social ordering is a function of the several individual orderings. Given a particular set of individual orderings, we obtain a particular social ordering; and so long as this particular set of individual orderings remains unchanged, we can compare the welfare of any individual or of the group itself under various actual alternative social states. If any of the individual orderings change, we will have a new set of orderings and can obtain a new social ordering, whereby, so long as the new orderings remain unchanged, we may from this single new vantage point make actual welfare comparisons between alternative social states. But when these orderings change, comparison of the affected individuals' or of the group's welfare under a social state when one set of orderings prevailed, with the social state when another set of orderings prevailed, is meaningless. Under the circumstances envisaged by Schoeffler, moreover, any change in the environment changes with it some individual orderings. A given set of orderings will prevail for one social state only, and when this state changes to the one with which it is to be compared, the set of individual orderings will also have changed. So it seems that we are left with no consistent criterion for making *any* actual comparisons.[6]

Schoeffler suggests that, even under the transitoriness of individual orderings, unambiguous welfare conclusions can sometimes be drawn by a slight modification in the definition of welfare change. His proposed treatment resembles Scitovsky's famous double criterion for judging changes in social welfare under alterations affecting income distribution. An individual is to compare social states A and B. Consider his comparison on the basis of the ordering which prevailed under both of the social states. Thus, for example, if he preferred A when A existed in fact and also after the change to B, then

[4] Schoeffler, *op. cit.*, p. 883.

[5] More complicated functions typically imply cardinal properties of utility.

[6] Anticipatory comparisons are of course possible, whereby *hypothetically* different social states are compared with the prevailing state; but these comparisons are without practical importance for our present purposes, since an alternative state conceived of cannot come into existence without changing some individual's ordering and making his original judgment inconsistent.

the change to B decreased his welfare. Similarly, if he preferred B both before and after the change to B, then he benefited from the change. If he preferred A before the change and B after, then Schoeffler defines the change as "welfare-neutral." If he preferred B before the change and A after, then Schoeffler defines the change as "welfare-abortive." These last two concepts essentially mean that only ambiguous conclusions can be drawn.

The crucial aspect of this method seems to me to be that prechange and postchange orderings are symmetrically weighted in deriving welfare conclusions. This is very likely an unobjectionable device for posing the general case; but I would suggest that there is an important subset of all cases where individual orderings change for which a lack of symmetry might be appropriate, and might, indeed, enable unambiguous welfare conclusions to be given more frequently than with symmetry.

One of the most important reasons for individual orderings to change is the accumulation of experience with old and new commodities which the consumer gains. Experimentation with familiar goods and services ordinarily enables the consumer better to evaluate how they satisfy him—enables him *more accurately* to order them *in accordance with unchanged underlying propensities*. Similarly, experience with new commodities does not ordinarily signify changes in the personality make-up of the consumer; but it does give him an opportunity not previously possessed to establish a consumption pattern closer to his essentially unchanged criterion of what is desirable. Schoeffler implicitly recognizes this phenomenon when he points out that "a person's attitude toward goods is determined in large measure by the assortment of goods which is *at present* in the visual field of the individual."[7] Attitudes toward goods are determined largely by one's experience of them—all other aspects of the personality unchanged.[8]

So, in the light of experience with various commodities, a consumer's orderings of social states will change. But because these changes are the results of learning, they are irreversible. Consider the model formulated by Schoeffler. Any action (or policy) which changes the social state will in general bring about also a change in some individual orderings. We desire to draw welfare conclusions about the change from state A to state B. Under State A, the individual's ranking is R_i^j, by which he prefers B to A; under B, it is R_i^k by which he prefers A to B. Schoeffler, treating R_i^j & R_i^k symmetrically, draws the conclusion that the change is "welfare-abortive" (an ambiguous conclusion). Can we *meaningfully* lessen the ambiguity? I suggest so.

If the change from R_i^j to R_i^k represents the clarification, the learning from experience about different types and combinations of commodities, then: (1) a change back from state B to state A would not result in a similar change from R_i^k to R_i^j; (2) A would have been preferred by the *i*'th individual over B both after and before the change if he had known more about B before the change; and this is testified to by our expectation that in the event of a

[7] P. 882. Italics mine.

[8] Georgescu-Roegen devotes substantially the whole of his admirable article, "The Theory of Choice and the Constancy of Economic Laws," to the implications of this factor for demand theory. *Quart. Jour. Econ.*, Feb. 1950, LXIV, 125-38.

change back to B, he would probably still prefer A, thereby enabling us to render in that event an unambiguous welfare conclusion that welfare is greater at A than at B.

Can we not, with this illustration in mind, feel justified in dropping the double ordering perspective when changes in orderings reflect trial and error approximations to an unchanged underlying predispositional scale? Our procedure, where justifiable, would be simply to evaluate the given change in terms of what Schoeffler calls the *ex post* ordering alone (R_1^k in our illustration), and would thereby enable us to draw unambiguous welfare conclusions.

Two related problems present themselves. First, how can one empirically tell when a particular change in some individual's orderings fulfills the characteristics described here? To be sure, no ordering change is due solely to clarification. All education changes the individual in some way. But modern psychology promises an ability in the not too distant future to limn empirically the major orientation patterns of an individual, and consequently to enable us to trace significant changes in these patterns. Certainly, it can not be expected that even in this near future we shall be able to separate out different kinds of changes in orderings with more than rough proximateness. But this may well provide a tolerable margin in actual empirical applications. It cannot be honestly contended that there is a much greater degree of correspondence between our present demand theory and the real world.

For our immediate purposes, however, there is the psychologists' suggestion that basic personality patterns do exist, and that they remain relatively stable through substantial portions of a person's adult lifetime. If we can accept for economic analysis the notion that the changes in orderings meriting multiple perspective weights are only those changes which reflect significant personality reorientations, then we can realistically assume "tastes" (as these basic orientations) to be constant for a much wider range of economic problems than has heretofore been possible.

The second issue raised is allied to the first, and is very serious. Why *should* economists identify tastes only as these basic orientations? Granted, where actually erroneous expectations account for some orderings, changes which reflect only a correction of such errors (let us call them "correctional changes") may appropriately be treated as approximations toward equilibrium within a stochastic conception of consumer behavior. There are, however, other changes in orderings which neither substantially represent trial and error revisions ("correctional changes") nor changes in basic personality orientations ("personality changes"). These represent moderately different ways of looking at various—even familiar—commodities; and they would seem to be exactly what economists have always referred to by the concept of "changes in tastes." Economists *have* not, in the past, restricted the concept solely to "personality changes." What justification is there now for such a restriction? If there is no justification, and one attempts actually to apply the schema presented here, then is it possible empirically to differentiate between corrective changes, which we would not want to consider changes in tastes, and those intermediate changes, which we would want to consider changes in

tastes? Finally, if we cannot in fact make this distinction but would nevertheless like to use the schema analytically, then wouldn't this practically involve dispensing with the concept of consumer equilibrium, since "equilibrating" changes could be considered as continuing indefinitely without any apparent tendency to converge?

I cannot give definitive answers to these questions. But I should like to suggest what kind of answer seems appropriate at this time.

1. There is justification for restricting the concept "changes in tastes" to "personality changes" (and thus, identifying "tastes" with basic personality orientation). This justification consists in the desirability of subsuming much of the intermediate class of ordering changes under the "corrective" category. We speak of changes in tastes as representing analytic discontinuities because they supposedly represent evaluative discontinuities for the individuals concerned. But the consumer typically does not feel such discontinuities when only minor ordering changes occur. He acts with most of them as though he had "learned better." This strongly resembles the characteristic of corrective changes. Evaluative discontinuity takes place when there is a significant change in perspective—when the consumer has experienced the change in basic personality orientation to which I have referred above as "personality change." In a real sense, then, all nonpersonality changes can usually be lumped together and simply treated as partaking more or less the character of equilibrating adjustments in the light of experience. For concrete applications, where it may be desirable to exclude ordering changes which partake "too little" of the character of "corrections," an arbitrary cut-off point can be established to suit the nature of the particular problem in hand.

2. If the procedure under (1) should prove unacceptable, and it be desirable that "intermediate" changes be included as changes in tastes, then the cut-off point mentioned above, where the change partakes "too little" of the character of correction (interpreted now more narrowly than above), assumes great analytic importance. Since the degree of "littleness" here is probably a continuum, the cut-off point will be arbitrary. But within this limitation, it seems reasonable to expect that at least a rough classification is possible by observation of consumer behavior. Interviewing studies, for example, would seem an appropriate tool for throwing light on this, since how the consumer describes his ordering change is evidence as to what kind of change it is. Reversibility or irreversibility of the ordering changes might be suggested as a useful index for classifying. Whatever the empirical means used, however, no substantial difficulties in principle suggest themselves why it should not be possible to come observationally close to any specified domain of the concept of correctional change—so long as that very domain can be operationally defined. The burden, indeed, would seem to be on the critic to say exactly what he means by the "intermediate" category.

3. Assuming that we do lump correctional with "intermediate" ordering changes, whether deliberately (as #1 argues), or inadvertently (as might occur if the argument of #2 were groundless), what becomes of the concept of equilibrium? A number of economists even now are convinced that applica-

tion of consumer demand theory to real world statistical observations requires interpreting the theory stochastically. A stochastic model postulates randomly distributed deviations from equilibrium over time, to reflect the trial and error behavior of consumers in seeking equilibrium. Thus, on this view, already current, the equilibrating process is not thought of as one of instantaneous adjustment but rather as one requiring perhaps considerable duration. It is by no means self-evident that by including "intermediate" changes as part of the random component we should be appreciably increasing the duration of the adjustment path, and thereby watering down the equilibrium concept.

It might be argued, in fact, that the proposed treatment of ordering changes strengthens rather than weakens the equilibrium concept. When "intermediate" changes are treated as changes in tastes, their supposed frequency means that before a consumer ever reaches one equilibrium he is imposing on himself the need to begin adjusting to a new one. Without the "feedback" of successfully realized equilibria to serve as incentive and guide for the consumer, the very meaning of adjustment becomes suspect; and in any case, prediction becomes hazardous for the economist in a system where initial conditions change more rapidly than ever full adjustment to old conditions can be attained. If conservation of the equilibrium concept be a legitimate methodological criterion—and of course it may not be—then lumping "intermediate" with purely correctional ordering changes would seem to possess this saving grace in at least as great a measure as existing stochastic theory.

To summarize the argument of this paper, I have in effect advanced a new definition of "tastes," under which it would be appropriate to draw unequivocal welfare conclusions even under those situations defined by Schoeffler as involving "changes in tastes." Some empirical and methodological implications of the new definition were briefly explored. It is hoped that the seemingly important analytic advantages sketched here will warrant deeper examination of this approach by others.

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A Theory of Excise Subsidies: Comment

In the September 1952 issue of the *American Economic Review,* Professor Earl R. Rolph[1] analyzes the effects of excise subsidies on product prices, money costs of production, and private money incomes and expenditures. He reaches the conclusion that in the case of a general subsidy granted to producers of all commodities at a uniform and proportional *ad valorem* rate no portion of the subsidy is shifted to consumers in the form of lower product prices; the entire amount is passed on to owners of resources (including both hired resources and resources attached to firms) in the form of higher incomes. The purpose of this comment is to point out that this conclusion depends upon additional assumptions not explicit in the analysis, and is in no sense

[1] "A Theory of Excise Subsidies," XLII, 515-27.

general. The principal point which the writer wishes to make is that in any model which embraces the whole of an economy, rigorous analysis of the effect of a new subsidy or tax is not possible unless assumptions are made with regard to *both* the expenditure *and* the receipts side of government.

This comment is confined chiefly to that portion of Rolph's analysis in which he considers a system of excise subsidies leveled at a uniform rate on all commodities. In the simple model analyzed, only two commodities, X and Y, are produced, under conditions of pure competition. Resource services are also competitively priced. Resources are fixed in amounts, and the price system is assumed to keep them fully employed. Under these conditions Rolph traces the consequences of subsidizing both commodities at the same *ad valorem* rate. No mention is made of the source of the funds out of which the subsidies are paid. During the analysis, the market demand schedules for the two commodities remain unchanged,[2] presumably indicating that buyers' disposable incomes are not altered by any immediate change in their tax burdens.

Since the subsidy is an addition to the firm's revenue per unit, its initial effect is to increase every firm's marginal revenue while leaving its marginal cost unchanged. Firms in both industries therefore seek to expand output, and increase their demands for resource services. But since output cannot be expanded, restoration of equilibrium requires an upward adjustment in the prices of resource services until "marginal costs rise and exceed market prices by the amount of the subsidy per unit at unchanged outputs." The net result: no change in the allocation of resources, no reduction in product prices; only a bidding-up of the prices of hired resources until "money costs of production are everywhere increased proportionately." Rolph notes that "these conclusions are inconsistent with those theories which hold that equivalent excise taxes are shifted to consumers."

In considering this analysis, several questions must be raised. Where does the government get the money with which to pay the subsidy? From new taxes? Evidently not—at least, initially. If new *indirect* taxes had been imposed, they would have affected the price of X or Y (since there are no other commodities to tax) and would have canceled, either wholly or partially, the effect of the subsidy—and no such offsets are noted in Rolph's analysis. Nor could new *direct* taxes have been imposed, since such a method of financing would reduce disposable incomes, shift market curves downward, and thus cause product prices to fall.[3] If, in an economy in which buyers' outlays for commodities X and Y exhaust their incomes,[4] new direct taxes were imposed equal to the subsidy payments, the market prices of X and Y would have to

[2] Rolph employs the device of considering a subsidy as a supplement to the price received by the seller rather than as a deduction from his cost. From the seller's standpoint, therefore, the subsidy shifts the demand curve. But the prices which buyers are willing to pay for various outputs remain unchanged.

[3] Direct taxes which absorb only loanable funds, leaving consumption funds undiminished, are conceivable, but are out of the question here since, in the model being discussed, "the resources employed to produce the two commodities exhaust the resources available to the economy"—that is, there is no net investment, no unemployment, and therefore, in the absence of deflationary or inflationary price movements, no net saving or dissaving.

[4] As stated in the preceding footnote, saving is zero in the model under consideration.

be reduced by an amount equal to the subsidy rate in order that output remain at the full-employment level. But if new taxes are not imposed, what method of government financing is employed? And since the subsidy has "a positive income effect with respect to all owners of resources," why does not the rise in their incomes cause them to increase their demands for X and Y? Somewhere among Rolph's implicit assumptions must be one that keeps the market demand schedules from changing.

In the absence of additions to tax revenue, the money used to pay the subsidies must come from one or more of the following sources: (1) drawing down of government bank balances, (2) printing new money, (3) credit-expansionary borrowing from the banking system, (4) borrowing from the public. The first three methods increase the purchasing power in the hands of the public, and may be described for our purposes as inflationary monetary expansion. The fourth method introduces new complications into the analysis, since its effects depend upon conditions with regard to such things as liquidity preference, interest rates, the rates of new saving and investment (if any), etc.; but if we restrict ourselves to the simplest case, where saving and investment are initially nil, so that government borrowing from the public must reduce consumption outlays by an equal amount, we can consider borrowing from the public as equivalent to taxation in its effect on demand. We may therefore group the sources of government funds into two categories: (a) withdrawal of consumption funds through taxation or borrowing, and (b) money creation.

Let us assume provisionally that the government subsidies consist of new money pumped into the system. The initial maintenance of demand for X and Y is now explained. But the final equilibrium would not be that of Rolph's analysis. The rise in incomes would shift demand schedules for both X and Y. Moreover, incomes would not reach a new equilibrium at a higher level, but would continue to rise so long as the inflationary method of financing continued. An equilibrium position is attainable only when government revenues (through taxation and/or borrowing from the public) rise sufficiently to offset exactly the rise in government payments due to the new subsidies.

The conclusion is inescapable that Rolph's model operates in the way he describes only when the following assumption is made: that aggregate tax receipts remain unchanged so long as aggregate income remains unchanged, but rise whenever aggregate income rises by an amount just sufficient to keep aggregate disposable income from rising. This assumption could be fulfilled if it were supposed that the taxing authorities made successive increases in tax rates as aggregate income rose. If this clumsy hypothesis is to be avoided, the only possible alternative is to assume that income tax rates are so steep that the tax rate on increments to income is 100 per cent. Only under such conditions would the higher money incomes be prevented from pushing upward the demand curves for X and Y.[5] Under less confiscatory tax rates (*e.g.*, those of

[5] Since saving and investment are nonexistent in the model being discussed, and since indirect taxation is ruled out by the nature of the problem, it is being assumed that all taxes are consumption-reducing taxes. The general argument being presented, however, does not depend on such an assumption. Even if saving and investment were introduced

the United States) income would have to rise several times the amount of the subsidy before the additional tax revenues rose sufficiently to halt the price-income spiral caused by the "deficit financing" character of the subsidy program. It is therefore not generally true that the final income effect is quantitatively equal to the amount paid by the government in the form of subsidies; the final income effect depends on the tax system: on how high the tax rate on incremental income is, and whether or not tax rates are changed.

Let us consider briefly four possible situations, in each of which it will be supposed that all disposable income is spent on X and Y in some fixed proportion (which means that the demand prices of X and Y at full-employment output vary directly with aggregate disposable income), and that government receipts and payments are in balance before the subsidy and new tax are put into effect.

1. Suppose, along with the subsidy, a new direct tax independent of income (for example, a property tax), continually subject to adjustment so that it is at all times just sufficient to defray the entire expense of the new subsidy program.[6] Suppose also that the tax system includes an income tax, so that the government's revenue is some function of aggregate income. Disposable income falls by the amount of the new tax. With their purchasing power reduced, people demand less of X and Y at current prices. The prices of X and Y must fall until the revenues of firms in the two industries have fallen by the amount of the new tax. Since the new tax receipts and subsidy payments are equal, product prices fall by the amount of the subsidy per unit. In this situation there is no income effect; the entire subsidy is shifted to consumers.

To make this point clear, imagine some part of the subsidy shifted to owners of resources, so that the prices of X and Y are higher than under the equilibrium just described. Income tax receipts would then be higher. Disposable incomes would not be sufficiently higher to raise the demand price of each commodity by the full amount by which unit payments to owners of resources were increased. The price could not be maintained at this higher level; it would fall, and continue to fall so long as government receipts exceeded payments. Equilibrium is possible only when the income effect of the subsidy is wholly obliterated.

2. Suppose now the same situation, except that the new tax brings in a constant amount just sufficient to defray the expense of the subsidy *at present product prices*. In this situation, too, the prices of X and Y fall. As they fall, the subsidy payments per unit of X and Y fall, so that total government payments become less than total government receipts. The budget surplus thus created has a further deflationary effect on product prices. In terms of marginal analysis, the subsidy per unit of output is no longer large enough to

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into the analysis and a new tax which absorbed only loanable funds were assumed, leaving consumption funds initially unaltered, the "income effect" described by Rolph would cause a rise in consumer demand for X and Y unless the community's marginal propensity to consume were zero. For simplicity's sake I shall continue to assume throughout this comment that saving and investment are nil and that taxes absorb only consumption funds.

[6] A constant tax revenue would not offset the subsidy under all conditions, since *ad valorem* subsidy payments vary with the prices of X and Y.

offset completely the reduction in the prices of X and Y forced by the reduction in disposable incomes, so that marginal revenue becomes less than marginal cost. As a result, firms reduce their demands for resource services; incomes of owners of resources fall; the demand curves for X and Y are shifted downward again; and so on. What brings this deflationary spiral to a halt is the fact that, as income falls, income tax receipts also fall. When they have fallen by an amount equal to the difference between the amount brought in by the new tax and the amount paid out in subsidies, the budget is once more in balance and equilibrium is reached.

3. Suppose another situation: the subsidy is accompanied by a tax, independent of income, sufficient to defray *half* the expense of the subsidy; also, income tax rates are such that half of increments to income are taxed away. In this situation equilibrium is reached when incomes rise sufficiently to raise income tax receipts by an amount sufficient to defray the other half of the expense of the subsidy. Incomes must rise by the full amount of the subsidy. The eventual position of equilibrium is the same as that described by Rolph. But if we regard this final outcome as reached by a succession of steps, and if demand is assumed to be a function of actually received income rather than anticipated income, the initial effect is different. The new tax shifts the demand curves for X and Y, and their prices fall by half the amount of the subsidy per unit. Only after the other half of the subsidy is passed on to owners of resources in the form of higher explicit and implicit prices of resource services does a partially offsetting upward influence on the demand for X and Y come into play, raising their prices and firms' marginal revenues. The higher product prices now raise firms' demands for resource services further, causing incomes to rise further, and so on, until product prices are restored to their original levels.

4. Suppose all taxes are direct taxes independent of income; suppose uniform excise subsidies of the specific type are imposed on X and Y; and suppose a new tax is imposed which brings in receipts exactly equal to the subsidy payments. (Alternatively, we could suppose an *ad valorem* subsidy and a continually adjusted tax, as in [1] above.) Under these conditions the government budget remains in balance regardless of changes in prices or incomes. Numerous equilibrium positions are equally possible: (1) in which incomes are increased by the amount of the subsidies, while product prices remain unchanged, as in Rolph's model; (2) in which product prices are decreased by the full amount of the unit subsidy, while incomes remain unchanged; (3) in which some part of the subsidy is shifted to consumers, the rest to owners of resources. The outcome is determinate only if additional assumptions are made, either (a) specifying consumer behavior when real cash balances change, and specifying whether or not the money supply remains constant, or, if consumer behavior is unaffected by changes in the real value of liquid assets, (b) specifying relative lags in responses to changes, as, for example, in adjustment of income payments received by owners of firms to changes in profits, and in adjustment of prices of resource services to situations in which marginal revenue and marginal cost are unequal. If the new tax reduces the demand for X and Y by the full amount of the tax before the income effect

of the offsetting subsidy has had a chance to negate the effect of the tax, the whole subsidy will be shifted to consumers. But if the initial income effect of the subsidy acts first, the model will conform to Rolph's analysis. If both influences take effect gradually, some portion of the subsidy will be shifted to consumers. If we assume an *ad valorem* subsidy and a constant addition to tax revenue, the outcome is determinate without additional assumptions; equilibrium is reached at those prices for X and Y at which the subsidy brings in an amount equal to the tax rate.

The above comments are equally pertinent to the study of the effects of differential or partial subsidies. If, in Rolph's model in which a subsidy is imposed on X and not on Y, the market price of X is unchanged and "there is no compensating fall in the demand for Y," it must be that no offsetting tax has been imposed (or, at least, taken effect), so that, for the time being, deficit financing bolsters demand and pushes up incomes.

Two broad conclusions seem called for:

1. The effects of an economy-wide tax or subsidy cannot be studied satisfactorily if analysis is restricted to partial equilibrium analysis. The question whether incomes rise or prices fall throughout the economy is a macroeconomic one and its answer depends on the monetary and fiscal measures being employed.

2. In an economy which collects some part of its taxes in the form of income taxes, the effect of a universal excise tax or subsidy depends on the level of aggregate income (and also, in the case of an *ad valorem* tax or subsidy, on the level of product prices) at which government receipts and payments are in balance. Only at the budget-balancing level is equilibrium reached in an economy without saving or investment. An excise subsidy, therefore, increases the price of resource services (and thus raises the incomes of their owners) only if, and to the extent that, the existing level of aggregate income is below the equilibrium level.

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A Theory of Excise Subsidies: Reply

Professor Abbott's criticisms are centered around his question, "Where does the government get the money with which to pay the subsidy?" (par. 4). Failure to deal with the implications of this question is the basis for his charge of my having engaged in implicit theorizing and, ironically, of partial analysis. I dealt briefly with the question in Section IV of the article under discussion but apparently with little success.

The issue raised by Abbott is an old and fundamental methodological one in fiscal theory. Can the effects of a particular public finance act be assigned to that act alone? Abbott wishes to ascribe to a subsidy the consequences of any tax or borrowing device deemed to be occasioned by the subsidy. If he is correct, attempts to formulate a separate theory of the effects of particular taxes or subsidies must be abandoned. The "effect of a subsidy" becomes the effects of at least two fiscal acts: the payment of the sub-

sidy and the levy of some tax or other financing device. Since the possible financing devices accompanying a subsidy are innumerable, one must be content to list mere possibilities—as Abbott does in his cases numbered one through four. His "models" could be multiplied indefinitely. Logically, he might have concluded that a separate theory of taxes or of subsidies has no meaning: there are only effects of various tax-subsidy, loan-subsidy, tax-expenditure, or loan-expenditure measures. The position he adopts is somewhat similar to that taken by De Viti de Marco and Duncan Black. My position is essentially that adopted by Edgeworth, Pigou, and Lerner.

I do not believe it to be self-evident that one should consider where the government gets the money to pay a subsidy in developing a theory of subsidies or how it spends tax proceeds in developing a theory of taxes. In practice, there is no conceivable way of finding out which taxes "pay for" subsidies to farmers or to veterans. Likewise no one can say which tax receipts or bond sales pay for the Air Force. Such questions have no conceivable answers and therefore have no meaning. The investigator who insists upon attempting to answer such questions must therefore be content to elucidate mere possibilities. By contrast, a study of subsidies or of taxes which attempts to reveal the effects of each type of fiscal act separately does permit the development of theories which apply to any possibility.

The procedure adopted in the article in question is soberly orthodox. Each class of fiscal acts is analyzed under *ceteris paribus* conditions; the effects of subsidies are ascribed to subsidies, of taxes to taxes, and of debt operations to debt operations. Contrary to Abbott's views, such a method does not preclude global analysis of government finance; it is by this route that all effects of fiscal actions may be discovered. Let us not make the mistake of supposing that there is something left out of account, such as deficits or surpluses, by this procedure. These have no effects independently of the effects of government expenditures, transfer payments, taxes, or debt operations. Deficits or surpluses are arithmetical computations, not fiscal acts, and are knowable only after the fact. Money creation by government has no causal significance either. The effects discussed under this guise are the joint results of the positive fiscal acts adopted—loans, taxes, subsidies, and expenditures. Abbott's remarks (as well as much textbook comment) appear to need some revision on this point.

Abbott's cases are too detailed to be discussed point by point but certain observations about them may be pertinent. Throughout he treats consumption as a function of income although net investment is assumed to be zero. Since, however, C equals Y under such assumptions, C cannot be a function of Y. The concept of a propensity to consume under such assumptions is inappropriate. Consequently, Abbott's aggregative system is left ambiguous.[1]

[1] Abbott employs a framework of zero net investment which he regards as also implied in my analysis by my assumption of full employment of resources (see his fn. 3). No such implication was intended in the article nor does full employment appear to imply any particular figure, including zero, for net investment. Gross investment means the money value of new real assets produced during the period and, as such, is a classification of output. Net investment is this sum minus the value of existing resources used up. Full

His cases suggest that the possibilities are so numerous and that shifting may occur in so many different ways that any generalized theories are inherently overstatements. Partly the problem may be that subsidies and taxes are viewed as shiftable even in cases where it is already assumed that the information concerning the amounts involved and the identity of those who pay the tax or receive the subsidy are known. Thus Abbott writes: "If the new tax [a flat-sum tax] reduces the demand for X and Y by the full amount of the tax before the income effect of the offsetting subsidy has had a chance to negate the effect of the tax, the whole subsidy will be shifted to consumers" (p. 894). Although specific excise subsidies are being assumed in this case, the argument could equally well be applied to flat-sum subsidies. By the reference to the income-effect of the subsidy (the increase in the incomes of those obtaining government money), the identity of those subsidized is treated as established. The "shifting" indicated occurs because those who are subsidized happen not to increase their expenditures as much as those subject to the flat-sum tax reduce their expenditures. But shifting of either taxes or subsidies cannot occur in this way. Tax and subsidy theory offers an explanation of how such fiscal devices redistribute income between the government and private groups and how they change relative distribution of income among private groups. Thus, for example, it may not be validly argued that a highly progressive income tax is shifted merely because the rich curtail their expenditures and thereby indirectly increase the real income of the poor. Such a proposition already presupposes that it is a known and definite fact that the tax rests upon the rich and as a result of that fact they curtail their expenditures as compared to the alternative of no tax. Accordingly, neither the tax nor the subsidy is shifted to consumers because people choose for some or no reason to spend less money from one period to the next and prices adjust downward from previous levels.

As to Abbott's two conclusions, I agree with the first without, however, agreeing with the apparent intended implication of the first sentence. The partial analysis technique in the commonly accepted meaning of that phrase—one-commodity-at-a-time approach—was definitely not the method used in the article in question.

As to his second conclusion, I see no advantage and many disadvantages in restricting one's analysis of subsidies or taxes to the special case of a balanced budget, if this is the intent of his penultimate sentence. In practice, budgets are not typically balanced. But in any event, Abbott's concluding sentence seems inappropriate. Subsidies paid by the government to private groups do something to them, regardless of whether aggregate income is above or below its "equilibrium level." This "something" is a positive element in the income of those initially subsidized. They may not be able to retain all of the subsidy because the subsidy formula may induce a type of behavior which shifts the

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employment of existing resources can and does exist with a substantial rate of net investment. The shifting argument as developed in the original paper can be applied to an economy in which all output consists of new resources (zero consumption). Here and elsewhere I detect in Abbott's thinking an inclination to regard stationary conditions as the proper setting for fiscal analysis—a view which seems to me to be needlessly limiting.

income to other groups. If the subsidy is of the excise type and happens to be general and uniform, this income shifting occurs by increasing the prices of hired resources under full employment conditions and of increasing their incomes via greater employment under less than full employment conditions. If the subsidy is not general, there is in addition a reallocation of resources in favor of those products heavily subsidized relatively to others. These conclusions hold regardless of what other financial devices the government may simultaneously emplcy, if any, including excise taxes. A system of subsidies may of course be offset by a system of taxes (as noted in Section IV of the article), but before such a statement can make any sense, one must know what effects of what fiscal devices are being offset.

Abbott's remarks, being directed almost entirely to the case of a general and uniform subsidy of all products, may misdirect attention from the main possible applications of the theory. In practice, governments are selective as to what products they subsidize as well as to what products they tax. Theories are needed to provide guidance to investigations of the effects of subsidizing housing, subway service, air transport, postal services, exports, and various food items. I agree wholeheartedly with the tone of Abbott's statements that partial analysis which does no more than glue attention on the particular industry subsidized—a common practice—may gravely distort research in these areas. Industries draw on a common pool of resources and are inherently interrelated. The implications of the extreme case of uniform and general excise subsidies are instructive as to the need for avoiding the error of regarding a subsidy to private enterprise or a loss on government enterprise in isolation, and in particular for avoiding the implication that subsidies necessarily "benefit" the buying public. In a competitive world, shifting of subsidies to consumers is not a real possibility.

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Elasticities, Cross-Elasticities, and Market Relationships: Comment

The value-theory literature of the nineteen-thirties in general, several revealing comments by Kaldor in particular, and especially Triffin's pioneering work in 1940 suggested to economists that it should be possible to classify market relations between sellers by cross-elasticities of demand alone. In an interesting recent article Professor Bishop called attention to certain difficulties which develop in connection with cross-elasticity classifications.[1] He suggested that we should turn to a different classificatory principle, using the ratio of own elasticity to cross-elasticity, as well as the own elasticity (*i.e.*, demand-elasticity with respect to the commodity's own price) separately. The present note expresses views summarized by the following propositions:

1. The difficulties which Bishop discusses do not legitimately arise if we are

[1] Robert L. Bishop, "Elasticities, Cross-Elasticities and Market Relationships," *Am. Econ. Rev.*, Dec., 1952, XLII, 779-803. A very useful bibliography, including references to Kaldor's and Triffin's work, is found in footnotes 1 through 3, p. 779.

concerned with the problem of classifying the ideal market structures of economic theory. Bishop seems to be unaware of this; at any rate he does not explain that his difficulties develop on a different level of analysis. In the subsequent pages I shall describe a simple system, based on cross-elasticities of demand alone, which seems satisfactory for the classification of the ideal structures. In my opinion it is an essential property of our concepts of market relations that they can be so defined.

2. Bishop's difficulties do legitimately arise on a lower level of abstraction the nature of which remains unexplained in his article. These difficulties deserve attention if we are concerned with developing criteria for deciding whether a real market relation does or does not satisfy some ideal relation "reasonably well." This is a different task from that described under (1). To this task my suggested classification of ideal structures is unsuited.

3. However, when concerned with the second task, we may apply a simple adjustment to the basic classification here suggested, without bringing in new concepts other than that of limited sensitivity. The resulting adjusted cross-elasticity classification is suitable to the second task. It is simpler than that suggested by Bishop and it avoids considerable logical difficulties which would be created by the use of Bishop's classificatory principles.

I. *Classification of Ideal Market Structures*

A purely competitive market structure is an ideal structure (model) in which a group of firms is treated as if it were producing a literally homogeneous product, the output of the group is treated as if it were infinitely greater than the individual output of a firm, and measuring rods are supposed to be infinitely fine with the result that reactions to changes in variables are viewed as continuous. The last of these working hypotheses (idealizations) implies that our analysis proceeds as if it were possible to observe the consequences of so-called infinitesimal price changes, that is, the *limit* of the ratio of the effect of a price change to the price change itself, when the magnitude of the price change is made to approach zero. If each firm actually could observe the consequences of infinitesimal price and quantity impacts, then the number of producers would have to be infinite in order to rule out oligopolistic interdependence. Concern with a limiting situation where numbers are treated as infinite and use of the infinite-sensitivity assumption are interrelated. The infinite-sensitivity assumption in turn is required for performing operations along continuous functions.

In its ideal form the concept of monopolistic competition in the large group incorporates the same idealizations, with the significant exception that the idealization pertaining to product-homogeneity is omitted. The members of the group, whose number is treated as infinite, are located not in a point but in a conveniently delimited region of the substitutional universe. The ideal form of pure or undifferentiated oligopoly differs from that of pure competition in that the group-output is treated as finite in relation to the firm-output. Therefore an hypothetical individual demand curve based on given other prices would shift whenever a firm moved along it: The rivals would feel the consequences of such a move and they would change their prices. In the ideal

form of differentiated oligopoly, or monopolistic competition in the small group, only one of the idealizations is retained, namely that concerning the continuity of reactions to infinitely small impacts. Numbers are not treated as infinite and the product is not treated as homogeneous. As long as, for methodological reasons, we postulate sensitivity to infinitesimal impacts, treating numbers as finite means placing a structure in the category of oligopolies. The effect of oligopolistic interdependence on market results may gradually diminish as the number of producers rises, even though their number stays finite; but a theory of *oligopoly* is required for proving this, if sensitivity to infinitesimal impacts is postulated.

No one ever believed that real market structures could be found which would possess the characteristics of the ideal ones, just as no one drawing, for example, a continuous Lorenz curve for an income-distribution, ever believed that the population of, say, a city, was perfectly divisible (*i.e.*, really consisted of an infinite number of the units arrayed along the abscissa). The real existence of a perfectly divisible population is as "unimaginable," as the real existence of an infinite number of firms in a point or in a finite region of the substitutional universe.[2] Sensitivity to infinitely small impacts also is unimaginable. But this in itself is irrelevant. In all sciences benefit can sometimes be derived from analysis in terms of models based on limiting assumptions of this sort. The results of such analysis frequently prove to be simple and good approximations to reality. Economists have of course been much less successful than natural scientists in their attempts to derive empirically significant conclusions from their ideal models. But, while in economics we usually cannot apply the results of pure analysis without making disturbingly large allowances for the imperfections of the real world, it remains a fact that our basic theories were established in terms of idealized models, and that the practical concept of market relations must be connected with ideal concepts, which can serve as a basis for generalized theoretical analysis.

I now turn to my first objective. This is the classification of ideal market structures, that is to say, of models in terms of which fundamental theories were developed rather than of structures "existing" in the real world. The classification can be undertaken with the aid of cross-elasticities of demand alone, and is summarized in Table I. Throughout this note, symmetry of market relations will be assumed. In other words firm-labels may be interchanged.

In the table E_{ij}^{U} stands for the cross-elasticity (logarithmic partial derivative) of the demand for the product of firm i with respect to the price at which firm j is willing to sell, when the price change is a price-increase. The concept will be called upward cross-elasticity. E_{ij}^{D} stands for downward cross-elasticity analogously defined. The initial situation must of course be conceived of as one in which both firms are actually selling.

The following explanatory comments should be added.

1. In pure competition the downward cross-elasticity of demand is infinite because if, *ceteris paribus*, firm j reduces its asking price infinitesimally, then

[2] The analogy should not lead us to overlook the fact that the substitutional universe has many more dimensions than natural space.

no other firm can sell at all. Such an experiment would of course destroy the initial market structure; firm j would displace all other firms, which produce the commodity in question. But this is no objection, since we are interested in identifying market structures not in conserving them. The cross-elasticity of demand expresses the effect on the demand for the product of i of a postulated price-change by j during the time-interval in which j is willing to sell at the changed price. While j is willing to sell cheaper, i can sell nothing at the original price. It is true that we are here concerned with merely *pure* (not necessarily perfect) competition, and that certain frictions are compatible with competition that is pure but not perfect. Perfect mobility is not postulated. But we are still dealing with an analytical idealization which would become undefinable by cross-elasticity, own elasticity, or any other formal criterion if we allowed the same commodity to be sold simultaneously at

TABLE I.—CLASSIFICATION OF MARKET RELATIONS

(Suggested for Definition of Ideal Structures by Consequences of Infinitesimal Price Changes)

Relationship between Firms i and j	Upward Cross-Elasticity E_{ij}^{U}	Downward Cross-Elasticity E_{ij}^{D}
Belong in same pure oligopoly	∞	∞
Belong in same differentiated oligopoly	Finite positive	Finite positive
Belong in same purely competitive group	0	∞
Belong either in same monopolistically competitive large group or not in same "group" of any conventional description. (Answer depends on group-to-firm cross-elasticity criterion, defined on p. 903.)	0	0

different prices. This would mean that a differentiated product could not be formally distinguished from one that is undifferentiated. Even in merely pure competition we have to insist on the inability of a producer to sell at a given price while another producer is willing to sell at a lower one. Hence downward cross-elasticity is infinite.[3]

On the other hand, upward cross-elasticity is zero in pure competition. If firm j raises its asking price infinitesimally, it faces zero-demand, and thus it removes itself from the market, but the sales gains which result from this

[3] If "pure" competition were interpreted as sufficiently imperfect to allow for the simultaneous sale at different prices of the identical commodity, then only perfect competition would be formally definable. The definition of perfect competition with its minimum long-run cost and zero-profit implications requires cost concepts, mobility-immobility concepts and certainty-uncertainty concepts in addition to demand concepts. Normally we conceive of pure competition as possibly imperfect but not so imperfect as to allow for the coexistence of more than one price for a homogeneous commodity. Only on this interpretation does pure competition become formally definable at all and in this case it can be defined by cross-elasticities of demand alone.

for others are distributed among producers whose number is treated as if it were infinite. In any undifferentiated market, atomistic or oligopolistic, the demand for the output of the individual firm i results from a random distribution of the as yet unsatisfied demand for the commodity as a whole at a given price; hence in an ideal undifferentiated *and atomistic* market the removal of j does not change the demand for the output of any individual rival.

2. If both upward and downward cross-elasticity are zero, this means that the two firms belong in the same monopolistically competitive large group, provided that they are viewed as belonging in one and the same group at all. In the monopolistically competitive large group the upward cross-elasticity is zero because the consequences of a reduction in the sales of an individual firm —say, of j—are distributed among firms the number of which is treated as if it were infinite. Among these there may exist a finite number of oligopolists but there must exist an infinite number of firms, such as i, for which the demand-increment is zero. The downward cross-elasticity also is zero because when the degree of price-reduction by j is made to approach zero, the sales-increase of j is a finite multiple of this small price-reduction and hence the reduction of demand for i becomes zero. $E_{ij}{}^{U} = E_{ij}{}^{D} = 0$ is a necessary condition of the ideal form of large-group monopolistic competition with which Chamberlin seems to be concerned in his as yet unpublished essay on market classification.[4] The ideal form implies an infinite number of producers and hence zero cross-elasticities. In *The Theory of Monopolistic Competition* Chamberlin says that for some purposes it is legitimate to treat the number of producers in atomistic structures as infinite but his detailed analysis there relates to the "real" (practical) structures to which we shall turn in Section II.

$E_{ij}{}^{U} = E_{ij}{}^{D} = 0$ is a necessary but not a sufficient condition of the ideal form of large-group monopolistic competition. This condition is satisfied also between two firms which are viewed as not belonging in the same group. An

[4] Bishop, who gives an account of this essay (conference paper) accuses Chamberlin of "odd perversity" for maintaining that while cross-elasticity may be infinite in the undifferentiated large group, it falls to zero with the least differentiation. But Chamberlin is quite right. The difference between homogeneity and the least differentiation is that in the event of homogeneity the price-reducing firm increases its sales in infinite proportion of the firm-output (and indeed displaces all other firms) regardless of how small the price-reduction becomes, while in the event of the least differentiation the sales-increment of the price-reducing firm can be made smaller than *any* finite magnitude provided that the price reduction becomes small enough. The proposition implies of course continuous demand curves.

This is not to deny the logical possibility of starting with, say, two differentiated producers and of increasing the number of firms in such a way that the cross-elasticities of demand should stay unchanged or should rise. But it is surely possible to increase the number of firms in such a way that the cross-elasticities should be falling with the result that the process tends toward a situation where the own elasticity stays finite and the sales-loss or gain of a firm in the event of unilateral price changes becomes distributed among an ever increasing number of other firms. In these circumstances, the fall in the cross-elasticity reflects the circumstance that, as the variety of products increases, a decreasing proportion of the customers of each firm can be tempted easily to shift to and from any one (increasingly specialized) rival. The own elasticity need not fall and it may conceivably rise, because it measures the joint temptation to shift to and from a great many rival specialities. This is how we arrive at the monopolistically competitive large group.

isolated monopoly satisfies this condition with all other firms.[5] The two firms belong in the identical monopolistically competitive large group only if, in addition to $E_{ij}{}^{U} = E_{ij}{}^{D} = 0$, another condition also is satisfied. A convenient way of expressing the further condition is to require that each of two group-to-firm cross-elasticities should exceed a critical value. The two group-to-firm cross-elasticities measure the demand-effect on i and on j, respectively, of a price change undertaken by all members of a group of firms[6] satisfying the following indivisibility requirement: the group must not be divisible into two subsets in such a way that one subset alone would show the required cross-elasticity in relation to i but not to j, and the other alone would show the required cross-elasticity in relation to j but not to i.[7]

A decision of analytical convenience must be made concerning the required or critical value of the group-to-firm cross elasticities. Problems of monopolistic competition are encountered as soon as each of the two group-to-firm cross-elasticities just described exceeds zero. For some purposes it is therefore possible to select zero as the critical value which must be exceeded. But frequently we wish to direct our analysis to an ideal group for which the value of the cross-elasticities in question is reasonably high, *i.e.*, to a fairly "close" group. This is because frequently we wish to construct the ideal equivalent of a real group which shows monopolistically competitive behavior in a significant measure, not just weakly.

3. The remaining definitional propositions of Table I seem self-explanatory.[8] The reader will notice that in this system a firm may very well be viewed as belonging in one group with some firm or firms, and in another group with others. We should add that extension of the classificatory system to symmetrical buyer-buyer relations,[9] and to asymmetrical relations, either between sellers or between buyers, would cause no difficulty. Nor would the extension of the system to complementary relations raise fundamentally different

[5] The ideal form of isolated monopoly may be defined as a firm i which satisfies the symmetrical zero-cross-elasticity condition with *all* other individual firms in the economy and can be paired with no other firm in such a way that both would satisfy the condition of sufficient group-to-firm cross-elasticity which will presently be described.

[6] In the ideal world this group must be treated as consisting of an infinite number of firms.

[7] This indivisibility requirement excludes establishing high group-to-firm cross-elasticities by lumping together all moving picture theatres and all stationery stores into one aggregate and by setting a group so constituted against a pair of firms consisting of a stationery store and a theatre. Such a group would satisfy the indivisibility requirement only for a very low group-to-firm cross-elasticity, corresponding to the relationship between the group of stationery stores and a moving picture theatre or the group of theatres and a stationery store.

[8] In differentiated oligopoly both the upward and the downward cross-elasticities are finite. As the price change by j approaches zero, the demand-effect on i continues to bear a finite proportion to the price-change. In pure oligopoly the downward cross-elasticity is infinite for the same reason as that which produces infinite downward cross-elasticity in pure competition; and the upward cross-elasticity is infinite because an infinitesimal price-increase by j removes j from the market and hence it increases the demand for the output of each rival in a finite proportion.

[9] With the aid of cross-elasticities of supply.

problems.[10] However, the system here presented can be employed only as a point of departure for the analysis of essential questions, such as those relating to the emergence and the survival of market structures and the behavior of firms under alternative market conditions. The analysis of these questions requires cost-concepts, mobility-rigidity concepts and certainty-uncertainty concepts as well as demand concepts. Furthermore, analysis that covers the whole network of economic activity requires the use of group-to-group as well as firm-to-firm and group-to-firm cross-elasticities.[11]

II. *Criteria of the "Practical Belonging" of Real Market Relations in Various Categories*

On the level of abstraction on which the analysis of Section I was conducted, the classification of Table I is satisfactory and hence Bishop's misgivings concerning cross-elasticity classification seem unjustified. We must interpret Bishop as being concerned with problems arising on a lower level of abstraction where he legitimately encounters the difficulties which he discusses. What imperfections of the real world do we have to take into account to arrive at this level of abstraction?

In the real world measuring rods are crude and successive reactions are forthcoming merely to finite changes in variables when these changes exceed certain threshold values. The limited sensitivity of measuring rods is the reason why a group may be *practically* nonoligopolistic even though the number of firms in it is finite.[12] A group is *practically* nonoligopolistic ("large") if the individual firm is an unnoticeable unit to its rivals; and the product is *practically* homogeneous if certain individual price-changes would completely eliminate the demand for the product of existing firms. In the practical universe we must "test" for these market characteristics by the consequences of *ad hoc* selected finite price-changes.

[10] Complementarity will express itself in negative cross-elaticties. Here it is not desirable to eliminate income effects because the nature of market relations is influenced by them.

[11] The system developed in my *Competition Among the Few* (New York, 1949), pp. 50-54, is much more complete in all these respects. The principles underlying my earlier classification are identical with these here employed but the earlier classification would be unnecessarily complex for the present purpose.

[12] If an oligopoly theory such as that of Cournot were acceptable, then a market structure could be "practically nonoligopolistic" in another sense, even on the assumption of infinite sensitivity. For example, in Cournot's theory, a group of 99 firms would produce 99 per cent of the competitive output, and hence the size of the group-output, and generally the market results, would be practically nonoligopolistic (practically purely competitive) even though the behavior of the group would be fundamentally oliogopolistic. But of course we do not wish to commit ourselves in advance to any such specific theory of oligopoly. Moreover, we want to take account of the fact that when in the real world a large group of producers is said to behave "atomistically," this is so because the limited sensitivity of firms makes them unaware of each other's individual influence, not because fundamentally oligopolistic awareness makes them produce results which in this particular case we may not wish to distinguish from the atomistic-competitive ones. If we find oligopolistic awareness in a real group, we want to place the group practically in the category of oligopolies and then turn to the question of what market results may be expected in the given oligopolistic circumstances.

Can we test in the practical universe with the aid of Table I? If we wanted to use the table for this purpose we would of course have to interpret the cross-elasticities of the table as incremental ratios, with conveniently chosen *finite* proportionate price changes in the denominator and the corresponding proportionate quantity changes in the numerator; and we would have to enter subjectively unnoticed ("negligible") quantities as zeros.

Table I is inadequate for testing by the consequences of finite price changes in the practical universe. The valid content of Bishop's analysis can be translated into our terminology by stating that Table I with finite price changes is not a reliable instrument when it comes to testing a real market. Bishop's illustrations of his problem never strictly observe the rules of the ideal universe, while, at least in most respects, they do conform to the rules of the practical universe which we are now considering. In his analytical operations the number of firms in large groups is always treated as finite, and what he calls a "small" price-reduction (a "shading" of the price) may result in a conceivably "enormous" increase in sales (*op. cit.*, p. 788). These are not infinitesimal price changes.

If Table I were used for testing real market structures with finite price changes, then two difficulties would arise.

A. The first difficulty gives rise to what appears to be Bishop's main problem. Table I tells us that a finite value for downward cross-elasticity is in itself conclusive evidence of an oligopolistic relationship. In large-group monopolistic competition downward cross-elasticity would have to be zero. But if we think in terms of limited sensitivity and of discontinuous reactions to successive finite changes in variables, then this ceases to be true. An hypothetical reduction of the price of firm j by, say, 10 per cent could result in growth of the firm from a subjectively unnoticed size to a size which is clearly noticeable to the individual rival. Downward cross-elasticity could be finite. Yet in such circumstances we would not wish to identify the new existing relationship as oligopolistic, any more than we wish to call a purely competitive structure monopolistic merely because a price-reducing firm could monopolize the market if the others kept their prices constant. Bishop attributes considerable importance to this difficulty. In his illustrations an atomistic differentiated structure may show higher cross-elasticity than an oligopolistic structure, provided that in the atomistic structure the own elasticity of the price-reducing firm is high enough. However, Bishop does not make it clear that this difficulty is a consequence of the finiteness of price changes by which, in a world of limited sensitivity and finite numbers, an initially unnoticed price-reducing firm is "made to change" to a noticeable one. The difficulty would not arise in a world of unlimited sensitivity because there the finiteness of cross-elasticity, as discovered by the test of an infinitesimal price change, would dependably disclose oligopolistic interdependence in a differentiated group. The difficulty would be spurious if in a world of limited sensitivity we were trying to test with infinitesimal price changes and thus were attributing to the system a sensitivity which it does not possess. A legitimate difficulty develops only if in a world of limited sensitivity we are testing with finite price-reductions, and in this case the

difficulty springs from the fact that a finite price-reduction may raise a variable—the sales of a rival—beyond a threshold value. This is how we should interpret Bishop's problem. At the same time Bishop does not make it clear that, taking limited sensitivity and finite price changes for granted, the difficulty can be avoided by using upward rather than downward cross-elasticity for oligopoly tests. If firm *j*, by reducing its sales or by removing itself from the market, could exert a noticeable influence on a rival, then we do wish to consider this relation oligopolistic. It would of course be very arbitrary to use the numerical value of the upward cross-elasticity, or any other figure, as a unique index of the degree of oligopolistic intensity, but the value of this cross-elasticity does dependably indicate whether, at the time of testing, oligopoly (noticeable individual firm-size) does or does not exist. The conclusion so far is that *a table which can be used for testing real markets should differ from Table I in that it should always require testing for oligopoly by upward cross-elasticity.* For "nonoligopolistic" relations and only for these will the value of this cross-elasticity be zero (*i.e.*, an unnoticeable quantity-change divided by a finite and noticeable[13] price-change).

B. We now turn to the second difficulty in connection with use of Table I for real testing.—Bishop does not discuss this second complication, although some passages of his analysis may show awareness of it.

Table I tells us that a finite value for upward cross-elasticity in itself discloses the existence of product-differentiation in oligopoly. This is true only when we assume infinitesimal price changes. With finite price changes, which are necessarily implied in any consistent interpretation of the Bishop problem, a finite value for upward cross-elasticity is inconclusive. The value of this magnitude, interpreted as an incremental ratio rather than a limit, will be finite (a ratio of two finite magnitudes) even if the product is homogeneous, provided that the group is oligopolistic. If firm *j* raises its price by 10 per cent and this leads to a 20 per cent increase in the sales of firm *i*, we do not know whether this is because *j* is a comparatively small oligopolist in an undifferentiated market (who completely removed himself from the market), or a comparatively large oligopolist in a differentiated market (who merely reduced his sales). However, the same difficulty does not develop if we test for product-differentiation by downward instead of upward cross-elasticity. Assume that firm *j* reduces its price by a conveniently selected critical margin, satisfying all the demand which it faces at that price and that this completely removes firm *i* from the market. In this case and only in this case are we willing to classify the product as practically homogeneous.[14] If by this cri-

[13] The quantity change for *i* is unnoticeable; the price-change by *j* has a noticeable effect on *j* itself.

[14] An unimportant complication may here be mentioned. Firm *j* may in the initial position be selling a differentiated product at such a low price, in relation to that of *i*, that a further small price-reduction completely removes firm *i* from the market instead of reducing its sales. In this case our criterion wrongly indicates product-homogeneity. Such pricing by *i* at precisely the upper border of the zone of coexistence, and by *j* at precisely the lower border, can be disregarded. Circumventing this complication would require making practical homogeneity dependent on the size of initially observable price-differentials. But this has the disadvantage of calling for an arbitrary decision as to what prices are precisely "equal"

terion the product *is* homogeneous, then we may consider the downward cross-elasticity infinite because the sales reduction which *i* suffers bears an infinite proportion to the zero-sales with which it ends the experiment.[15] The conclusion is that *a table which can be used for testing real markets should differ from Table I in that it should always require testing for product-differentiation by downward cross-elasticity.* For homogeneous products the value of this will be infinite, for differentiated ones finite. This is the adjustment of procedure for which the second difficulty calls.

Our task is to adjust Table I to the practical universe, and thus to avoid having to turn to different principles for the testing of real relations. The essential step in the adjustment is to omit (or make less specific[16]) some of the information contained in Table I and thus to derive Table II.

TABLE II.—CLASSIFICATION OF MARKET RELATIONS BY LESS SPECIFIC DESCRIPTION OF FINDINGS ENTERED IN TABLE I

(Suggested for Testing Real Market Relations by Consequences of Finite Price Changes. Elasticities then Become Incremental Ratios, not Limits in the Sense of Calculus)

Relationship between firms *i* and *j*	Upward Cross-Elasticity E_{ij}^{U}	Downward Cross-Elasticity E_{ij}^{D}
Belong in same pure oligopoly	Positive	∞
Belong in same differentiated oligopoly	Positive	Not Infinite
Belong in same purely competitive group	0	∞
Belong either in same monopolistically competitive large group or not in same "group" of any conventional description. (Answer depends on group-to-firm cross-elasticity criterion, defined on p. 903.)	0	Not Infinite

If we could test by infinitesimal price changes and could possess the data required for placing a structure in a box of Table I, we would always have to place the structure in the identically described box of Table II, simply by listing our data in less detail (less "sensitively"). An ideal structure possessing the characteristics of a category in Table II would also possess the *additional* characteristics of the same category in Table I. The ideal relations stay defined by the conditions of Table I.

However, if Table II is used for the testing of real markets by *ad hoc* selected finite price changes, then it performs a useful analytical function. The two difficulties which were discussed in the present section are avoided. According to Table II, oligopoly is diagnosed by the noticeability to rivals of

in a differentiated market. Quantity measures which would be common to all species of a genus may not be easily found.

[15] In the event of finite changes it is of course always arbitrary whether a proportionate change is computed in relation to the bigger or the smaller of two quantities. Here it is convenient to compute it in relation to the smaller.

[16] Less specific in the sense in which "positive" is less specific than "positive infinite."

a price *increase* undertaken by an individual firm, that is, by the non-zero value of upward cross-elasticity. Product-homogeneity is diagnosed by the complete removal from the market of all other members of the group, under the influence of a conveniently selected critical price *reduction* by a single firm. It is diagnosed by the infinite value of downward cross-elasticity.[17] In the ideal universe of Table I any combination of atomism-oligopoly with homogeneity-differentiation *could* be diagnosed by this same double test; but in the ideal universe some structures are recognizable in a simpler way by a single test, based either on upward or on downward cross-elasticities.

Table II describes reasonable criteria for the classification of real market relations. Tests of this sort can of course rarely be carried out by statistical analysis but it must be assumed that persons familiar with conditions in an industry are capable of making estimates which are helpful for answering the questions posed by Table II. These questions relate to the order of magnitude of firm-to-firm and group-to-firm cross-elasticities.

Using Table I, with infinitesimal price changes, for the definition of ideal market relations, and Table II, with *ad hoc* selected finite price changes, for the testing of real markets, has the advantages of linking our two universes of discourse by a well-defined procedure. By *practically* belonging in a specific category, according to Table II with finite price changes, the various structures satisfy some but not all conditions of *ideally* belonging in their respective categories. By comparing the two tables it is possible to indicate what imperfections we temporarily neglect if, in the first approximation, we treat "practical belonging" in a category as if it were "ideal belonging," thus gaining the advantages of operating along continuous functions. The decision concerning the magnitude of the price changes for testing must of course be made dependent on analytical objectives. In one instance we may be concerned with what happens in some specific range of changes, in another instance our concern may be with the effects of changes falling in a different range. Accordingly we may wish to place the same structure in different "practical" categories, to obtain a point of departure for the analysis of the consequences of firm and group behavior under given market conditions.

III. *Comparison with Bishop's Suggestions*

Testing by finite price changes, whether a moderately large group of somewhat insensitive producers behaves more-or-less like an ideal group in which the number of producers is treated as infinite, is of course a different task from that of defining a model in which the number *is* treated as infinite. The diffi-

[17] Practical belonging of i and j in large-group monopolistic competition requires not merely that the structure should fall in the last row of Table II but (by analogy to the ideal world of Table I) also that the condition of sufficient group-to-firm cross-elasticities should be satisfied. Here too problems of monopolistic competition develop in principle as soon as the "critical" cross-elasticities are greater than zero but frequently we will want to insist on a higher critical value.

A firm practically belongs in the category of isolated monopoly if with all other firms in the economy it belongs in the last row of Table II, and if it satisfies the condition of sufficient group-to-firm cross-elasticities in conjunction with no other firm.

culties to which Bishop has called attention are real and important, but only if we are concerned with testing market relations by finite price changes under conditions of insensitivity to the very small.

Instead of overcoming the difficulties by some procedure such as that developed in the preceding pages, that is, by allowances for limited sensitivity, Bishop turns to a very different classificatory principle. He defines an elasticity *ratio*, dividing the elasticity of demand with respect to the own price (E_{ii}) by the cross-elasticity of demand (E_{ij}), and he states that this ratio tends to rise with the number of firms in the group.[18] More precisely, in a differentiated structure a high ratio of E_{ii} to E_{ij} means that, from the point of view of firm i, firm j has a small "weight" or relative importance in the universe of all firms.[19] Having thus tested for atomism-oligopoly by what he calls a "numbers-equivalent" (namely by the elasticity ratio), he proceeds to testing for homogeneity-differentiation by the own elasticity taken separately. For example, in Bishop's terminology a sufficiently high elasticity ratio and a sufficiently high own elasticity mark "near-pure competition." Low elasticity ratio and high own elasticity mark "near-pure oligopoly."

It should be added that not only the own elasticity is influenced in a rather complex fashion by product-differentiation but the cross-elasticity and the elasticity ratio also are. The elasticity ratio is not a pure indicator of numbers (corrected for size-distribution), since the relative weight or importance of j for i, in the universe of all firms, depends on relative substitutional distances as well as on numbers and on size-distribution. This is not overlooked by Bishop and it is not in itself a shortcoming of the ratio. Numbers and size-distribution create merely a vague presumption as to the nature of a group. In the real world we cannot avoid facing the question of limited sensitivity and of threshold values. Interest attaches to numbers only because they are more readily ascertainable than elasticities. But Bishop's suggestion that the elasticity ratio be called a "numbers equivalent" may not be fortunate.

The distinctive feature of Bishop's classification is the use of the own elasticity, and particularly the elasticity ratio, in addition to cross-elasticity concepts. Bishop needs the distinction between upward and downward cross-elasticity, as we do, although he disregards this distinction except in a footnote dealing with a side issue.[20] In addition he uses the own elasticity and its ratio to cross-elasticity. This is the characteristic property of his system.

[18] A double-sized firm should be regarded as the equivalent of two unit-sized firms.

[19] The own elasticity expresses the effect on firm i of a price change undertaken by all other firms (because, neglecting the income effect, this is the same thing as the effect on firm i of a price change undertaken only by itself); and the cross-elasticity expresses the effect on firm i of a price change undertaken only by firm j. The elasticity ratio therefore is inversely related to the relative significance of j in the group of all firms, from the point of view of i.

[20] In some of the cases which Bishop discusses in detail the value of the upward cross-elasticity is very different from that of the downward cross-elasticity. If, for example, a small firm in a differentiated market grows to many times its initial size by finitely reducing its price, the downward cross-elasticity must be many times greater than the upward cross-elasticity. For the context in which Bishop mentions the distinction between the consequences of price-increases and of reductions, cf. *op. cit.* p. 793, footnote 24.

Bishop's additional concepts are not needed for classification. Indeed, use of the elasticity ratio destroys something that is carefully preserved in the simpler classification presented in this paper. For, in the classification here suggested, homogeneous competition and oligopoly remain definable in the same framework that also serves for the definition of differentiated large and small groups. This is true of the ideal as well as of the closely related practical universe. The concept of differentiation does not become logically divorced from the concept of homogeneity. In Bishop's system it does. Reliance on the elasticity ratio excludes the unity of treatment here preserved. Bishop is aware of the fact that the elasticity ratio assumes the meaningless value of infinity divided by infinity in pure competition as well as in pure oligopoly.[21] His "near-pure" structures are defined with the aid of a concept which gives meaningless results for the "pure" structures. Why invite this logical difficulty if the concepts causing it are unecessary additions to upward and downward cross-elasticity which alone are required for classification?

WILLIAM FELLNER*

[21] In pure competition this is true only if downward cross-elasticity is used for computing the elasticity ratio. But Bishop thinks in terms of downward cross-elasticity. For the undifferentiated structures the logic of the elasticity ratio breaks down because if the effect of a price change undertaken by a single rival is expressed by "infinite," then the relative importance of that rival cannot be measured by comparing this effect with that of a price change undertaken by all rivals.

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Elasticities, Cross-Elasticities, and Market Relationships: Comment

The article by R. L. Bishop on "Elasticities, Cross-Elasticities, and Market Relationships" followed, and apparently received a strong orientation from, a prepublication copy of my own paper on "Measuring the Degree of Monopoly and Competition," presented at the Talloires meeting of the International Economic Association in September 1951. In one section of my paper Robert Triffin's classification of the problems of monopoly and competition in terms of cross-elasticities alone, and in particular his statement that the (price) "coefficient of interdependence measures the relative share of monopoly and competition in the situation of the seller"[1] were subjected to various criticisms. It was concluded that cross-elasticity is significant only as a measure of isolation and that "elasticity as well as cross-elasticity is needed to classify the problems of monopolistic competition"—needed specifically as a measure of heterogeneity. In spite of his sweeping criticisms, Bishop seems to agree with me as to the need for elasticity and has even less faith in cross-elasticity than I had retained.

When Bishop's article was published it seemed likely that the proceedings of the Talloires meeting would appear shortly, as indicated by his footnote (p. 779). Alas, a year has passed and they are still in press, but present indi-

[1] *Monopolistic Competition and General Equilibrium Theory* (Cambridge, Mass., 1940), pp. 131-32.

cations are that they will soon be available[2] and that the reader will no longer be obliged to pass judgment on my position without having read my own full development of it in its original context,[3] where its appearance at all is explained mainly by Triffin's having advanced (price) cross-elasticity as a *measure* of monopoly and competition (*cf.* the title of my paper).

One might say loosely that Bishop's major contribution to a satisfactory solution of this range of problems is a convincing demonstration of the complexity, even the treachery, of cross-elasticity as a measure of anything. More specifically, he shows that price cross-elasticity does not provide a clean-cut distinction between isolation and nonisolation: the effect on the sales of firm j of a price adjustment by firm i may be "negligible" even though the supposedly relevant cross-elasticity is high. The reason is that *however small* the relative change in j's sales, $\Delta q_j/q_j$, the relative change in i's price, $\Delta p_i/p_i$, may (owing to high elasticity of i's demand curve) be *still smaller*, thus making the cross-elasticity coefficient, $p_i \cdot \partial q_j/q_j \cdot \partial p_i$, large. This is a demonstration of importance and amounts to showing that cross-elasticities of zero are a sufficient but not necessary condition to isolation. It follows that nonzero cross-elasticities are a necessary but not sufficient condition of nonisolation.[4] Because of Bishop's analysis we must now recognize explicitly that there remain cases of nonzero cross-elasticities where the question of whether a seller is isolated or not must be settled by other criteria.

In recent years I have been concerned to bring into a single category the two concepts of an "isolated monopolist" and of a single seller in the "large-numbers-differentiated-product" case; and this is an important part of the background of the classification appearing at the end of my Talloires paper.[5] A monopolist who is isolated in the sense of being able to disregard the interdependence between his own market and those of others is described in *Monopolistic Competition* as so situated that "the effects of a change inaugurated by [him] are spread over such a large number of competitors that they are negligible for each.[6] Similarly, the "large group" case is characterized by the fact that "any adjustment of price or of 'product' by a single producer spreads its influence over so many of his competitors that the impact felt by any one is negligible and does not lead him to any readjustment of his own situation" (p. 83). It seems clear that these two concepts come to the same thing, and it is important to identify them for a number of reasons. One of the reasons is to make clear that ordinary, traditional (isolated) monopoly, now commonly known as "pure" monopoly, is not pure at all, but an integral part of the monopolistically competitive system.[7] Such a monopoly may in

[2] *Monopoly and Competition and their Regulation* (London, Macmillan and Co.).

[3] This implies no misrepresentation by Bishop.

[4] *Cf.* Bishop, *op. cit.*, p. 787.

[5] *Cf.* also "Monopolistic Competition Revisited," *Economica*, Nov. 1951, XVIII, 353.

[6] *The Theory of Monopolistic Competition*, 6th ed. (Cambridge, Mass., 1948), p. 74.

[7] Bishop speaks of my "*long-standing conviction* that there is no such thing as a 'pure monopoly' short of a simultaneous monopolizing of all economic goods" (p. 785, n. 10, italics mine). It is indeed a "conviction" of long standing, but the language seems strange in view of the fact that the concept of pure monopoly certainly came into modern eco-

fact be correctly regarded as a single firm in a "large group" of some appropriately broader category. Similarly, a single seller in a group free from oligopolistic influences appears to be isolated as truly as the traditional monopolist (and therefore in the now prevalent terminology would be a "pure" monopolist, which is absurd).

From these considerations comes a second reason why the identification in question is important, *viz.*, that isolation and nonoligopoly are thus revealed as the same thing. This is certainly not what Triffin says in his schema, where, among other things, "isolated selling" is clearly not a part of "heterogeneous competition."[8] Yet in using cross-elasticity coefficients to distinguish isolation from nonisolation, I have merely followed Triffin (and also general usage) in this particular matter. It is not clear to me whether Bishop regards isolation and nonoligopoly as the same thing; but it is clear that his criticism of my use of price cross-elasticity as a test for *oligopoly* is equally applicable to Triffin's use of it as a criterion for *isolation*: Triffin's coefficient may be significantly large consistent with the isolation of firm *i*.

For these and other reasons, the manner in which Bishop singles out my own analysis and classification for nothing short of total condemnation seems strange indeed. Even though criticised only in part, it is rejected *in toto* as "unsuccessful" (p. 794), and, again *in toto*, because it "breaks down completely" (p. 797). This disposition follows the setting up of an unqualified black-and-white contrast between Triffin and myself: "I have chosen Triffin and Chamberlin as the principal antagonists [sic]," he says, "because of the dramatic clarity of their differences" (p. 785, n. 11). The differences are indeed substantial, but in pressing his contrast to the limit, Bishop is obliged to minimize (for instance, as "temporary back-sliding," p. 788) or to ignore altogether Triffin's very substantial use of price cross-elasticity, both as a measure of monopoly and competition and in testing for oligopoly; and to give to Triffin's position a one-sided definiteness which it simply does not have. This procedure causes great confusion, not only in understanding and appraising the real position of each of us, but also (and more important) in understanding the fundamental issues of the problem. It is especially confusing when we look at Bishop's own classification and find that in the end it is Triffin's which has been completely rejected and that he follows me as against Triffin (without saying so) in taking "own" elasticity, not cross-elasticity, as the proper measure of heterogeneity (pp. 797-98 and table).

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nomics (possibly the term itself was used earlier—I do not know) as a part of my own terminology (*cf. Monopolistic Competition*, pp. 63-64) and is now widely perverted to a completely different meaning, usually without even a reference to its original one. The matter is important because the definitions of the two *limiting* cases of pure monopoly and pure competition are necessarily a part of the interpretation one gives to the theory "intermediate" between them, so that to redefine one of them is disastrous.

[8] *Op. cit.*, p. 104. In my Talloires paper I had criticised Triffin's identification of "heterogeneous competition" with a "finite value" of cross-elasticity, pointing out that "the coefficient approaches zero, not only under 'isolated selling,' but also under heterogeneous competition with 'large numbers.'" Bishop seems to agree with this criticism, for he refers to "the fact that this cross-elasticity may be indefinitely small under differentiated competition" as "at least somewhat embarrassing for Triffin" (p. 786).

Does Bishop's criticism invalidate the use of price cross-elasticity coefficients to measure the influence of one firm upon another, and hence to indicate the presence or absence of oligopoly? Certainly it does not completely, for a coefficient of zero[9] is still a sure sign of isolation, even though we may have isolation without it. But it appears certain that its usefulness is diminished. As I have indicated above, we are limited now to saying that zero coefficients are sufficient but not necessary to isolation, and that nonzero coefficients are necessary but not sufficient to nonisolation. The problem remains of distinguishing which of the cases with nonzero coefficients are isolated and which are not.[10]

After all, it is not surprising that this intermediate area should exist.[11] Tabular arrangements of coefficients may have their limited usefulness, but they also run the danger of making the problem look deceptively precise. I am bound to say that I still find unobjectionable my own statement of twenty years ago, as a description of isolation. It was quoted earlier, but let me repeat it: "that any adjustment of price or of 'product' [or of selling outlay] by a single producer spreads its influence over so many of his competitors that the impact felt by any one is negligible and does not lead him to any readjustment of his own situation."[12] It should be noted that zero cross-elasticities, though sufficient, are not necessary to isolation in this sense; and also that in the vexed case of pure competition, however one may rule as to the value of the cross-elasticity coefficient, a single seller is isolated in the sense described.

Recognition that the line of separation between isolation and nonisolation is not precise in terms of some particular cross-elasticity coefficient seems to me to affect in no essential way the argument of my earlier paper. For instance, I continue to hold that the individual seller is isolated under what Bishop calls differentiated competition; also under pure competition; and that the essential distinctions are between heterogeneity and homogeneity, isolation and nonisolation. The implications of this conclusion are decidedly different from those of Bishop's classification, especially when the "loose ends" of this latter are taken into account.

The coefficient proposed by Bishop as an indicator of oligopoly, *viz.*, $-E_{ii}/E_{ji}$, takes us back to the familiar "numbers" criterion for "well-defined groups" of sellers of equal size with perfectly symmetrical relationships between them; and it is interpreted as a "numbers equivalent" where these conditions are not met (p. 798). It is, as Bishop points out, not "perfectly

[9] In both directions and for completeness, of course, with respect to *all* elements of the problem, such as price, quantity, product, selling outlays, etc.

[10] This would include also the cases where some of the coefficients involved were zero and others were nonzero. For instance, in Bishop's case where the "own" elasticity of firm *i*'s demand curve is high (*cf.* p. 911, above), the substitution of q_i for p_i in the cross-coefficient converts it from large to very small.

[11] A number of the factors which help to explain it are mentioned in *Monopolistic Competition*, Ch. 3 *passim*, esp. pp. 48-53.

[12] *Monopolistic Competition*, p. 83. (*Cf.* also p. 150). Triffin's translation of this statement into mathematics (*op. cit.*, p. 102), out of which his coefficient developed, certainly leaves much to be desired.

general," since it "breaks down in the case of literally homogeneous products." Hence in his classification "the limiting case of perfect homogeneity [is] not represented"—the nearest we get to it is "near-homogeneity." It is therefore necessary outside of the table to distinguish between pure competition and pure oligopoly, and between differentiated competition and "pure monopoly" (in the sense of an isolated seller). These "loose ends" involve major differences with my own classification which are perhaps more important than those contained within the table, and the reader will have to judge them for himself. The distinction between "differentiated competition" and "pure" (*i.e.*, isolated) monopoly involves the "industry" concept which, however useful it may be in particular problems, seems to me a delusion for this purpose. My own reasons for avoiding the "industry" concept and for approaching the oligopoly problem not as a matter of numbers but as a matter of the isolation or nonisolation of individual sellers, are explained at some length in my paper.

I should like to comment finally on one of the contrasts between Triffin and myself which is given great importance by Bishop—the question of whether costs should be allowed to influence a price cross-elasticity coefficient, or whether, on the other hand, this coefficient should, like "own" elasticity, be kept a matter of "pure" demand relations. On this issue Bishop sides with Triffin, holding that the effect of costs should be ruled out, and he has harsh words for those of the opposite opinion, of which I seem to be one.[13] The issue is dramatized by the common view that under pure competition the coefficient is zero if rising marginal costs are allowed, and ∞ if they are not allowed, to limit the increase in sales of the firm which shades its price. It appears to me now that neither of these conclusions is as certain as has generally been thought, and that the answer will in each case depend upon some further questions of interpretation.[14] But let us first look into the question of whether the effects of cost considerations must necessarily be ruled out of price coefficients on general grounds, regardless of the market structure involved.

In arguing that costs should be excluded, Bishop holds in effect that there is a single "correct" answer to the question, and this I cannot accept. Both types of coefficient seem to exist in the sense that they can be defined, and it is simply a question of their relative usefulness. He argues furthermore that the answer must be the same for both elasticity and cross-elasticity, *i.e.*, that since it is absurd to "invoke supply restrictions" with respect to elasticity, it is necessarily so with respect to cross-elasticity (p. 792). But this argument by analogy makes no sense to me; and no one so far as I know has proposed

[13] I agree with Bishop that the "other combatants" should not be neglected (p. 785, n. 11), but cannot take the space here to discuss them. Incidentally, Triffin's use of profits in what appears to be his final and "general" statement on defining the oligopolistic problem (*op. cit.*, p 115) clearly includes costs.

[14] In particular, the distinction between the *magnitude* of the adjustment and the value of the coefficient as a derivative is essential. The problem can be formulated in such a way that the rising cost curve of the firm i (which shades its price) reduces $\Delta q_j/q_j$ to zero *by limiting the magnitude of the adjustment,* but without affecting the value of the coefficient itself.

modifying elasticity of demand by introducing "supply restrictions." The fact is that cross-elasticity is *not* a relationship between the demand functions of two firms, and therefore can never be "pure" in this sense.[15] The coefficient between two firms cannot be discovered from their two demand curves because it depends also on such matters as the number of "other" firms and a complex of interfirm relationships not contained in the two curves. Neither one of their demand curves is in fact involved in the coefficient in any direct sense. When firm i shades its price there is no movement along its demand curve so far as *cross*-elasticity is concerned: i's increment of sales does not appear in the coefficient. As for firm j, what is involved is diminished sales at the *same* price, in other words a redefinition of its demand function rather than a movement along it. In the broadest sense, cross-elasticity involves "the rest of the economic system," and in describing the effect on q_j of a change in p_i there seems to be a good case for describing it as it actually is, rather than ruling out any part of the restraints which the system has imposed upon it in transmission from i to j.[16] Bishop speaks critically of "those writers who measure cross-elasticity, following an assumed price cut, not in terms of customers' willingness to buy, but in terms of the firm's willingness to *sell*" (p. 792, italics his). This is incorrect. The coefficient as used by the writers in question does measure the amount which j's customers are willing to buy (from j, naturally) as the result of a price cut by i.

I shall not take the space here to discuss adequately the behavior of the price cross-elasticity coefficient under pure competition, for the reason that this appears to be a rather complicated problem under the theory of limits, with several different answers depending on how it is conceived mathematically. To state only three possibilities, the coefficient may be defined as (1) the limiting value of $p_i \cdot \Delta q_j/q_j \cdot \Delta p_i$ as $\Delta p_i \to 0$, the number of sellers and "own" elasticities being either (a) very high but finite, or (b) infinite; or (2) the limiting value of (1) as the number of sellers approaches ∞, "own" elasticities being given; or (3) the limiting value of (1) as "own" elasticities approach ∞, the number of sellers being given. The list is not exhaustive, and it should not be overlooked that, under certain definitions of the problem, numbers and elasticities will be functionally related. It seems doubtful if any one solution can be designated as *the* "correct" one, and doubtful therefore whether the price coefficient, which changes from 0 to ∞ and back again to indeterminate-

[15] Perhaps the elasticity of substitution between two commodities might qualify as "pure" in the sense of having to do only with substitutability. It is, of course, a completely different concept from cross-elasticity of demand, although I believe there is much confusion on this point. As a simple example, the elasticity of substitution between two brands of canned peas may be very high, but if there is a "large number" of other similar brands, cross-elasticity of demand may be very low. Kaldor seems to go astray here (*cf.* "Market Imperfection and Excess Capacity," *Economica*, Feb. 1935, V, 35, n. 1).

[16] I do not mean to rule here that any particular kind of mathematical function or procedure is the "right" one, since I am in fact protesting against Bishop having done just this. Thus demand curves are not necessarily Marshallian, in the sense of being obtained by holding all other prices constant, and however defined, their elasticity may be measured. Similarly, there is no single requirement as to what must be held constant and what allowed to vary when cross-elasticity is measured.

ness with a slight flick in the definitions, may be usefully applied at all to this limiting case. For economics the important concept is isolation, and however the cross-elasticity coefficient may be evaluated under pure competition there can be no doubt whatever that the individual firm is isolated in the sense that it has no influence on any other firm.

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Reply

My differences with Professor Fellner may be focussed on a single issue of central importance. Fellner maintains, in both his Tables I and II, that upward cross-elasticities must be zero between any two firms in atomistic competition (pure or differentiated); and he holds, similarly, that positive upward cross-elasticities necessarily imply oligopolistic interdependence. It is my view that cross-elasticities (upward and downward) may be positive, and indeed very large, without implying oligopoly. Specifically, cross-elasticities will be high between any two members of a large-number group when the products of the rival firms are sufficiently near the homogeneity pole. Fellner's conclusion (usually without the upward-downward distinction) has been the instinctively plausible one to many people.[1] Hence it is all the more important to emphasize the grounds for my different view. I do so by means of a numerical example.

Imagine 1,000,001 suppliers of physically comparable but very, very slightly differentiated products. Assume that the firms are all charging equal prices and selling equal quantities. Assume, furthermore, that if the ith firm's price is raised very slightly (with all other prices constant), all but a negligible fraction of the business lost by that firm is transferred, in equal amounts, to the 1,000,000 other firms in the group. This means that the change in q_i will be (approximately) 1,000,000 times the opposite change in any other group member's q_j—in both absolute and percentage terms. For example, if p_i is increased so that q_i declines by 1 per cent, each q_j will increase by (approximately) .000,001 per cent. This is the negligible impact of one atomistically competitive firm on its fellows. I propose to show that it does not necessarily imply a "zero" or negligibly "small" cross-elasticity.

Suppose, now, that the ith firm's own elasticity E_{ii} (up or down) is $-1{,}000{,}000{,}000$. To reduce q_i by 1 per cent, p_i need be raised by only about .000,000,001 per cent. Hence the cross-elasticity E_{ji} is approximately 1,000, since the .000,001 per cent increase of q_j is 1,000 times the initiating percentage increase of p_i.

Now I beg the reader who sits in judgment to contemplate: (1) this very large number of firms; (2) this enormous own elasticity, implying a remarkably close approach to product homogeneity; and (3) this very high cross-elasticity! Is this situation oligopolistic or not? If it is not, let us be rid once and for all of the tempting but quite erroneous preconception that high cross-

[1] Still another example of this view comes from R. L. Hall and C. J. Hitch: "If . . . cross elasticities . . . were not negligible, . . . the situation would thus be oligopolistic"—"Price Theory and Business Behaviour," *Oxford Econ. Papers*, No. 2, May 1939, p. 16.

elasticities necessarily imply oligopoly. Negligible impacts of one atomistic firm on another are not the equivalent of small, let alone zero, cross-elasticities.[2] What *is* small in any symmetrical, large-number group (with finite own and cross-elasticities) is E_{ji} *relative to* $-E_{ii}$.

Before considering the ingenious and challenging ways in which Fellner seeks to avoid these conclusions, I should like to plead guilty to two of his charges: (1) my classificatory scheme is stated in terms of "point" elasticities and cross-elasticities (based on smoothly continuous demand functions); and (2) I regard a large but finite number of firms in a group as sufficient to establish atomistic competition, by contrast with oligopoly. Fellner does not object to either of these practices separately; but he regards their combination as somehow invalid.

As to my use of "point" rather than "arc" concepts, this was also the practice of all my predecessors, including Fellner; for we all used partial derivatives in our elasticity and cross-elasticity notation. Point elasticities are convenient because of their lack of ambiguity. Specifically, they characterize a firm's situation with respect to even the smallest conceivable price-quantity change; and they also reflect, approximately, the implications of small, finite changes.[3] The underlying conception of smoothly continuous demand functions is, of course, an "idealization"—but again one that is familiar, convenient, and often (though not always) a defensible approximation of discrete reality. My basic disagreement with Fellner concerns his view that there is some tying clause in the theorist's contract that necessarily links this idealization with another quite different one—namely, an insistence that atomistic competition cannot exist with anything short of an "infinite number" of firms.

In the context of Table I, Fellner uses point cross-elasticities but refuses to classify a situation as atomistically competitive unless there is an "infinite number" of rival firms. He would thus classify my numerical example, above, as an instance of "differentiated oligopoly." As long as Fellner remains within the context of his Table I, a million suppliers of perfect or near-perfect substitute products are just a million oligopolists. I regard such situations as constituting either pure or near-pure competition.

To Fellner, the mere use of point elasticities and cross-elasticities by the analyst implies an assumption of "infinite sensitivity" on the part of the firms, which in turn would imply (in his view) that any finite-number group is necessarily oligopolistic. Several methodological questions of some subtlety are involved here; but the main point, it seems to me, is that Fellner here confuses the mere use of a convenient *analytical tool* (point elasticities) with an unjustifiably stringent *empirical assumption* (that, if a firm can detect even the

[2] Naturally, cross-elasticities are not *necessarily* high in atomistic competition. Even when products are still very nearly perfect substitutes, E_{ji} will be very low provided that the number of firms is sufficiently large. In my numerical example, E_{ii} need be changed only to $-1{,}000$ in order to reduce E_{ji} to .001.

[3] It is for this reason that there is no inconsistency in drawing conclusions about the consequences of small finite price changes in the light of elasticities that are based on infinitesimal price changes. But I cannot accept Fellner's contention (pp. 905-06) that the "valid content" of my article is *limited* to a context of "finite price changes."

smallest effect on itself of another firm's action, its reaction will necessarily be such as to establish oligopolistic interdependence).

Oligopolistic and atomistic *behavior* are distinguished according to the presence or absence of effective collusion. We merely try to predict the outcome of that "behavior" test by means of such "structure" tests as the number of firms.[4] If "numbers" are sufficiently large, we infer (empirically) that any relevant change of business decision by firm i will have, at most, a "negligible" impact on j; and we then conclude (empirically) that j's reaction, if any, will also be "negligible." It is not necessary that either the initial effect or the reaction be literally "imperceptible," but only that the interfirm repercussions be negligible *even if perceived.*

For example, a purely competitive firm will typically affect price ever so slightly if it changes its output substantially; but the situation will still be purely competitive, for all practical purposes, if the demand schedule relevant for the firm's output decision differs only negligibly from the strictly horizontal. This does not require that the change of that firm's output will have literally no effect on the outputs of the other firms, but only that the reactions of those other firms must not be such as to destroy the approximate horizontality of the relevant demand facing the one firm.[5] The main point is this: if the negligible impact of any one firm on its fellows gives rise to only microscopic, "passive" reactions, there can be no significant degree of oligopolistic interdependence. The equilibrium position of each firm will then differ only negligibly from what it would be if the effects of one firm on another were regarded as wholly imperceptible.[6]

[4] Alternatively, when groups are not well-defined, symmetrical, and isolated, I use the concept of a "numbers equivalent"—as a substitute for dubiously meaningful, actual numbers. Then $-E_{ii}/E_{ji} = n_i - 1$ implies that the effect of a change of p_i on q_j is *as if* the two firms *were* members of an ideally symmetrical, isolated group of n_i firms.

Fellner thinks that my choice of "numbers equivalent" as a name for this concept "may not be fortunate" (p. 909). My reason for that choice is that the *analogy* to the number of firms in a well-defined, symmetrical group is intuitively meaningful. On the other hand, because a "numbers equivalent" is applicable "even when there is no distinct grouping of firms" ("Elasticities, Cross-Elasticities, and Market Relationships," *Am. Econ. Rev.*, Dec. 1952, XLII, 789 and 798-99), the concept is in no way dependent on the "industry concept" (*cf.* Chamberlin, pp. 913-14).

[5] Naturally, the demand relevant for a firm's price-output decision is not, in general, a *ceteris paribus* demand; but it is an essential condition of atomistic competition (pure or differentiated) that the other-prices-constant demand be a very close approximation of the relevant demand. For example, if all the members of a purely competitive group have *fixed supplies*, the relevant demand facing the ith firm has an elasticity equal to n_i times the industry-demand elasticity, where n_i is the ratio of industry quantity to the ith firm's quantity (*cf. op. cit.*, p. 795, esp. n. 26). With *variable supplies* (upward-sloping marginal costs), the relevant elasticity is even higher; for a given increase of q_i, lowering price very slightly, will then reduce all the q_j's microscopically, and so cause price to fall even *less* than in the case of fixed supplies (*op. cit.*, p. 797, n. 28).

Although "negligible" and "imperceptible" are often used loosely as synonyms, I feel that it is neither necessary nor desirable to make atomistic behavior depend on the myopia or the "limited sensitivity" of the firms, as Fellner would have it (p. 904, esp. n. 12). In my view, the mere "awareness" of *very small* effects is not likely to give rise to oligopolistic *behavior;* and it is this presumption as to behavior, it seems to me, that is the proper focus of market classification.

There is a world of difference between such microscopic, passive reactions and oligopolistic interdependence. The typical oligopolistic reaction to a price cut is not just passive, but retaliatory. That is, it is designed to discourage such price cutting in the first place, even at the immediate cost of the retaliator's hurting himself even as he seeks to discipline the aggressor. Oligopolistic collusion, explicit or tacit, accordingly implies a *reluctance* to make certain aggressive moves *solely* because of an expected or feared reaction from one or more rivals. Hence an oligopolistic "equilibrium" typically implies that the firms are at positions significantly different from those that would be implied if the firms were to make their business decisions on an assumption of negligible reactions from rivals.

The likelihood that collusion will be attempted—and if attempted, successful—depends not only on the mere perceptibility of the effects of one firm's actions on another, but on the *magnitude* of those effects and the *character and magnitude* of the reactions. Least of all can the likelihood of oligopolistic behavior be prejudged simply on grounds that the analyst chooses to use point elasticities (or arc elasticities that are based on very small finite price changes). I confess I am somewhat surprised to have to rebut a view that the principles of *Competition Among the Few* are now automatically applicable to "competition among the few million" simply because the author used point elasticities.

I also have misgivings about Fellner's use of the concept of an "infinite number" of firms. Some limits can be reached (*e.g.*, an absolutely homogeneous product). Others cannot (*e.g.*, an "infinite number" of firms). "Infinity," in this context, is not a "number" but simply an implication that there is no finite limit. In Fellner's Table I, point cross-elasticities (upward and downward) are *infinite* when identical products are supplied by any finite number of firms. But he also believes that, with an "infinite number" of firms, the upward cross-elasticities will be uniquely *zero*. Now if this is to mean anything at all, it must mean that the upward cross-elasticities *approach* zero as the number of firms grows indefinitely large. But this they do not do, on the testimony of Fellner's own Table I. With strictly homogeneous products, the leap from infinite to zero cross-elasticity takes place only in a never-never land of "infinite numbers" of firms. Hence it is not consistent with the basic principles of taking a limit.[7]

Provided that there is a very large number of producers of a homogeneous product, I also think that either the Cournot model or the Bertrand model is quite acceptable (again *cf.* Fellner's n. 12). These two models then give approximately the same results. They give significantly different results, and are both unacceptable, only when the number of firms is small. In other words, neither Cournot nor Bertrand had a satisfactory theory of *oligopoly;* but they both did have satisfactory theories of *competition.*

[7] In the foregoing paragraph I have willingly repressed my own misgivings about the determinacy of cross-elasticities when there are three or more suppliers of absolutely homogeneous products (*op. cit.*, pp. 793-94). I am willing to follow the convention that Fellner seems to accept—namely, that any change in q_i will affect oppositely, to at least some extent, every other q_j in the group. Then the cross-elasticities within the homogeneous-product group are all infinite no matter what the number of firms—just as the cross-elasticities *approach* infinity when product homogeneity is merely approached, for any given number of firms.

A fundamental logical trouble that has afflicted cross-elasticity pronouncements from the very beginning is that two kinds of limit are involved: (1) if own elasticities are constant and finite (because the product is not strictly homogeneous), a steady increase in the number of firms in the group does imply a steady *decrease* of cross-elasticities toward *zero* as a limit (never actually reached); and (2) if the number of firms is constant, an approach to product homogeneity implies a steady *increase* in cross-elasticities toward *infinity* as a limit.[8] Fellner's mistake, as I see it, is in supposing that the number-of-firms limit (which cannot be reached) must be dominant over the product-homogeneity limit (which can). If *both* of these limiting processes are operating simultaneously, no one can say *in general* how the cross-elasticities will behave.[9] But cross-elasticities may assuredly be either high or low no matter how many firms there are in the group. It all depends on the number of firms *relative to* the degree of product homogeneity (as reflected specifically in the own elasticities).

In the context of Table II, Fellner relaxes his requirement that there must be an "infinite number" of firms for atomistic competition; but now he insists that cross-elasticities must be based on "*ad hoc* selected finite price changes." He also specifies the treatment of "subjectively unnoticed ('negligible') quantities as zeros." When products are homogeneous (absolutely or practically) and firms are many as in my opening example, a negligible increase of p_i has a negligible effect on q_j. Hence the upward cross-elasticity would be "negligible" over "negligible," which at least suggests—if it means anything at all—the indeterminate form of zero over zero. More fundamentally, as long as Fellner refuses to measure "neglibles," he has no grounds for asserting anything whatever about their ratios to one another.

Fellner would say, however, that his upward "incremental" (or arc) cross-elasticities are uniquely zero in my numerical example. Clearly, this is not just a matter of "point" versus "arc" elasticities; for my own example was stated in terms of a finite price increase, and the "incremental" cross-elasticities turned out to be very high. Fellner gets his result of a "zero" cross-

[8] For a welcome expression of essentially the same view, see Chamberlin's limiting processes (2) and (3), p. 915. Fellner, on the other hand, implies a denial that the latter limiting process is a continuous one. Defending a position taken earlier by Chamberlin, he maintains that "while cross-elasticity may be infinite in the undifferentiated large group, it falls to zero with the least differentiation" (p. 902, n. 4). It falls to zero, say Fellner, because "in the event of the least differentiation the sales-increment of the price-reducing firm can be made smaller than *any* finite magnitude provided that the price reduction becomes small enough." This remarkable argument implies that *every* finite derivative and elasticity is zero. My opening numerical example provides my own positive demonstration of nonzero and *high* cross-elasticities in the "large group . . . with the least differentiation."

[9] In the second paragraph of n. 4, p. 902, Fellner implies agreement with this view; but he fails to recognize that it undermines his central thesis as to the uniquely zero upward cross-elasticity in pure competition.

Although Chamberlin now seems to be with me for the most part on these questions, our agreement is still not complete. His limiting process (1) on p. 915 implies that there is a limiting value of the expression given there when "the number of sellers and 'own' elasticities" are "infinite." This is the same meaningless concept for which I am criticizing Fellner.

elasticity only by specifying that the price increase must *not* be negligible, even though a much smaller—and specifically negligible—price increase must be sufficient to remove the homogeneous-product supplier from the market. In my example, something on the order of a .000,000,1 per cent increase in p_i would very likely be enough to reduce q_i by 100 per cent.[10] That would increase each of the q_j's of the 1,000,000 other firms in the group by about .000,1 per cent; so the cross-elasticities would still be on the order of 1,000. Hence, to reduce the cross-elasticities even to 1, Fellner would have to specify a price increase about 1,000 times larger than necessary to remove the price-raiser from the market; and to reduce the cross-elasticities to .001, he would have to specify a price increase about 1,000,000 times larger than necessary.

Although Fellner does not indicate just how arbitrary his "*ad hoc* selected finite price changes" are, they are "*ad hoc* selected" simply to make the upward cross-elasticities sufficiently small for his own taste—when he wants them to reveal atomistic competition. This reminds me of Humpty Dumpty's practice: "When *I* use a word, it means just what I choose it to mean—neither more nor less." When Fellner measures an incremental cross-elasticity under conditions of pure or near-pure competition, its magnitude is just what he chooses it to be.

In my own classificatory scheme, despite Fellner's strictures, there is no *general* need for a distinction between "upward" and "downward" elasticities or cross-elasticities. Such a distinction would be needed only if the firm were to operate at a point where there is a "kink" or discontinuity of slope in its demand curve.[11] Such a "kink" in a consistently other-prices-constant demand curve results, for example, when some buyers regard the products of two or more firms as homogeneous, while others regard them as differentiated.[12] Because this phenomenon implies that the demand slope is first negative and then changes abruptly to zero at a critical point, no firm will actually operate at that point. Rather, some firms will compete for the homogeneous-product business, and thus be somewhere on their demands' horizontal stretches, while others may be content to exploit their demands' downward-sloping portions. Depending on the number of firms, those with locally horizontal demands are, in effect, in situations of either pure competition or pure oligopoly. On the other hand, *smoothly continuous* demand functions always imply *equal* upward and downward elasticities, both own and cross. That is, the point

[10] This implies that the demand for the ith product is approximately linear. I am assuming—as is certainly possible—that the price increase necessary to reduce quantity by 100 per cent is approximately 100 times the price increase that reduces quantity by 1 per cent.

[11] The familiar, oligopolistic "kinked" demand is not germane here. That is based on an other-price-constant demand for price increases and an other-prices-changing demand for price decreases. Fellner and I are both talking about other-prices-constant demand relationships.

[12] *Cf.* A. J. Nichol, "The Influence of Marginal Buyers on Monopolistic Competition," *Quart. Jour. Econ.*, Nov. 1934, XLIX, 121-35; Alfred Nicols, "The Rehabilitation of Pure Competition," *Quart. Jour. Econ.*, Nov. 1947, LXII, 31-63; Joe Bain, *Pricing, Distribution and Employment*, rev. ed. (New York, 1953), pp. 353-55; and Ron Hieser, "A Kinked Demand Curve for Monopolistic Competition," *Econ. Rec.*, May 1953, XXIX, 19-34.

elasticities are exactly equal; and the arc elasticities based on sufficiently small price changes are approximately equal.[13]

Naturally I am gratified that Professor Chamberlin now agrees with me that the cross-elasticities E_{ji} and E_{ij} are not, by themselves, a reliable indication of the presence or absence of oligopoly. It was because he had proposed these cross-elasticities as his test for oligopoly that I characterized his classification as "unsuccessful."[14] I regret, however, that I have left him with only a negative conviction of the "complexity" and "treachery" of cross-elasticities "as a measure of anything" (p. 911); for—when products are differentiated, however slightly—the *ratios* of cross-elasticities and own elasticities do seem to provide the oligopoly test for which he has been unsuccessfully searching. As for my having adopted E_{ii} as my own preferred criterion of product homogeneity-heterogeneity, I am happy to acknowledge that I did indeed follow Chamberlin in this.

In his Talloires paper, as Chamberlin now says, he criticized "Robert Triffin's classification of the problems of monopoly and competition in terms of cross-elasticities alone" (p. 910).[14a] He also feels that I exaggerated the contrast between Triffin's views and his own; and, by way of illustrating this, he says that I "ignore altogether Triffin's very substantial use of price cross-elasticity . . . in testing for oligopoly" (p. 912). It is my view, on the contrary, that Triffin relied principally on the quantity cross-elasticity e_{ji} in testing for oligopoly. His only use of the price cross-elasticity E_{ij} for that purpose, it seems to me, was in conjunction with e_{ji}—in his "circular test."[15] Hence I also feel that Chamberlin's critique of Triffin's schema—by concentrating solely on E_{ij}, to the neglect of e_{ji}—was seriously incomplete. I say this only to emphasize that Chamberlin's objections to the contrasts that I found between Triffin's discussion and his own do indeed reflect fundamental differences between us in our understandings of Triffin.

Several matters discussed by Chamberlin seem to be mainly if not entirely verbal. He wishes "to bring into a single category the two concepts of an 'isolated monopolist' and of a single seller in the 'large-numbers-differentiated-product' case"—because "these two concepts come to the same thing" (p. 911). Everyone agrees, I think, that these two cases are alike to the extent that they are both nonoligopolistic. Beyond that, it seems to me mischievous in the extreme to suggest that there are no significant differences between them. The traditional, simple monopolist is "isolated" because there are *no* significantly close substitutes for his product. The differentiated competitor is "iso-

[13] I detect no belief on Fellner's part that "kinks" are as universal as his "upward-downward" distinctions would seem to imply. The one such contrast in his Table I, I have argued above, is the result of faulty logic. The omnipresent contrasts of this kind in his Table II are manufactured by his arbitrary use of incremental cross-elasticities.

[14] Although at one point Chamberlin might now seem to be minimizing his former "faith in cross-elasticity" (p. 910), there is no question that he did use that concept to distinguish (in his own terminology) "isolated selling" and "nonisolated selling."

[14a] I assume from the context of the Talloires paper that this refers only to *price* cross-elasticities.

[15] Triffin, *Monopolistic Competition and General Equilibrium Theory* (Cambridge, Mass., 1940), pp. 104-5 and 134.

lated" in a very different sense, because he is lost in the crowd of so *many* suppliers of relatively close substitutes that his relationships to his competitors are again nonoligopolistic.[16]

Another of Chamberlin's verbal problems concerns just this ambiguity of the word, "isolation." For Triffin, "isolated selling" is associated with "pure monopoly," and *not* with atomistic competition, whether pure or differentiated. Yet for Chamberlin, isolation and nonoligopoly are "revealed" as the same thing (p. 912). The correct word is "defined"; and we can take our choice in following either Triffin's or Chamberlin's definition.[17]

The last verbalism is the term, "pure monopoly." An overwhelming majority of economists prefer to equate this with the traditional concept of monopoly. Thus we have not followed Chamberlin's own distinctive definition of "pure monopoly"; but we do not feel that we have "perverted" anything in setting up simply a different definition from his. Nor does the redefinition seem "disastrous" (p. 912, n.7). I, for one, rather feel that it is healthy to resist the theoretical imperialism by which Chamberlin would swallow up traditional, simple monopoly as just another species of monopolistic competition.[18]

I have little to add to my earlier discussion on "the question of whether costs should be allowed to influence a price cross-elasticity coefficient."[19] I do believe, however, that it is just as ill-advised to "invoke supply restrictions" with respect to cross-elasticities of demand as Chamberlin concedes it to be with respect to "own" elasticities. The generalized demand for the ith firm's product, on which both E_{ii} and E_{ij} are based, is of the form: $q_i = q_i(p_1, p_2, \ldots p_i, \ldots p_j, \ldots p_n)$. The derivatives, $\partial q_i/\partial p_i$ and $\partial q_i/\partial p_j$ (or the elasticities, E_{ii} and E_{ij}) are then precisely analogous to one another.[20] Moreover, the naked expressions, $E_{ii} = (\partial q_i/\partial p_i)(p_i/q_i)$ and $E_{ij} = (\partial q_i/\partial p_j)(p_j/q_i)$, have perfectly definite meanings; and they cannot be made to stand for anything else except by some more Humpty-Dumptyism.

[16] I also feel that it is perfectly feasible to distinguish the pure monopolist from the differentiated competitor, in terms of the frequency distribution of cross-elasticities (*op. cit.*, pp. 786-87 and 799-800).

[17] Chamberlin also says: "in using cross-elasticity coefficients to distinguish isolation from nonisolation, I have merely followed Triffin. . . ." (p. 912). But, since his definition of isolation is completely different from Triffin's, I cannot agree that my criticism of the "use of price cross-elasticity as a test for *oligopoly* is equally applicable to Triffin's use of it as a criterion for *isolation*. . . ." My criticism would be so applicable only with respect to "isolation" as *Chamberlin* defines it.

[18] According to Chamberlin, "the now prevalent terminology" implies that any nonoligopolistic seller "would be a 'pure' monopolist"—since such a seller is "isolated as truly as the traditional monopolist" (p. 912). It seems peculiar, to say the least, for Chamberlin to attribute this view to his opponents—since it is he who would blur the distinction (which the rest of us seek to maintain) between the traditional monopolist and the nonoligopolistic species of monopolistic competitor.

[19] Chamberlin's discussion is on pp. 914-15; my own is *op. cit.*, pp. 790-92.

[20] The "own" concept is a "diagonal" term, and the "cross" concept is an "off-diagonal" term, in the matrix of either the derivatives or the elasticities, respectively.

Nor is there any notable significance in the otherwise perfectly correct fact that a change of p_i represents a *movement along* a demand of the abbreviated form, $q_i = f(p_i)$, while a change of p_j may *shift* that same $q_i = f(p_i)$. When demand for the ith product is more broadly formulated, as above, that generalized demand function is not "shifted" by changes of either p_i or p_j.

There would be no objection whatever to Chamberlin's defining any alternative concepts that he pleases—with or without reference to costs. When he writes down either partial derivatives or the elasticities based upon them, however, I would hope that he might specify—as he has not done in the past—the *functions* he is differentiating. Only in that way can we judge (a) the meaning and (b) the usefulness of the concepts he may have in mind. In particular, if he thinks he can define meaningful and useful elasticities of demand (including cross-elasticities) by "invoking supply restrictions," by all means let him come forward with a *specific* definition.

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BOOK REVIEWS

Economic Theory; General Economics

Utility and All That, and Other Essays. By D. H. ROBERTSON. (London: George Allen and Unwin. New York: Macmillan. 1952. Pp. 206. $3.50.)

In this volume are assembled sixteen of Sir Dennis Robertson's essays written from 1945 to 1951. They are arranged in four groups dealing with general theoretical matters, with problems of interest and capital, with international economic affairs, with money and banking. The essays vary greatly in length and significance, from one paper which attempts a reorientation of the theory of interest to a number of brief occasional notes. All of the essays afford valuable insights; all are delightful reading for the author's Puckish jibes and asides; and all of them cut through jungles of theoretical pretense or confusion with the keen hard blade of common sense.

The last of these qualities stands forth conspicuously in the first essay, the subject of which has been taken for the title of the collection. Reviewing the recent literature on consumers' surpluses and welfare, Robertson finds that Hicks' and Allen's indifference functions and "revealed preference," designed to operate behavioristically and to dispense with one dimension called cardinal utility, actually make matters more complex. Cardinal utility keeps reasserting itself, and it is better to recognize it explicitly, as Marshall does. The reviewer agrees with Robertson that introspection justifies the concept of cardinal utility; but operationally the difference may not be great. Anyone who prefers to operate with ordinal concepts could read the familiar Marshallian figures correspondingly, since the monetary expression of utility may be in either relative or absolute terms.

In the same essay, Robertson indicates his belief that welfare economics should be able to steer a course somewhat between the one extreme, represented by Myint, who imagines a measure of *social* gain or loss possible even with changes in distribution, and another extreme, represented by Samuelson and Little, who are very sceptical about the possibility of measurement. Most readers will sympathize with Robertson here. They may wish, however, that he had pressed further his suggestion that the maintenance of incentive enters into the problem of maximizing social welfare. Hitherto inequality of distribution has been the rock upon which aggregate social welfare has split up. But if we limit the theory to *functional* inequalities—inequalities necessary to "evoke and maintain" correct relative factor supplies (in Hobson's phrase) —and if we suppose with Lange that the distribution of the capacity to enjoy income is a random one in any fair sample of the population, we approach fairly closely to a social maximum of welfare. Other elements, such as resentment of inequality, would still make precise quantification impossible; but in many situations they might be sufficiently unimportant to permit the desirable *direction* of policy toward maximum welfare to be seen.

In "The Economic Outlook" written in 1947 Robertson, with what in retrospect amounts to prophetic revelation, considers the pitfalls of planning in the English postwar economy. "Years of lowbrow talk about production for use and not for profit, fewer but intenser years of highbrow talk about the humbug of finance and about investment breeding its own saving have left us with a formidable web to unwind" (p. 56). As an antidote to these errors, he quotes the sentence of Marshall that "Progress mainly depends on the extent to which the strongest, and not merely the *highest* forces of human nature can be utilized for the increase of social good." He also broaches the profound question whether there is any final and ultimate distinction between democratic and totalitarian planning.

Robertson's presidential address to the Royal Economic Society, "On Sticking to One's Last," takes issue with a former president, Mr. Hawtrey, and denies that the economist should concern himself with other objectives than economic welfare, such as National Prestige, and Employment (as an end in itself rather than as a means of earning income). The economist is bound to point out, for example, such homely facts as over- or undersupply and the wastage they entail, even if these conditions result from attempts to serve some high principle of moral justice. Conversely he must also distinguish between useful injustices and useless or harmful ones.

The end piece of the first group of essays is Robertson's half-mischievous review of the first volume of *A Survey of Contemporary Economics*. For the "headmaster" of this school (in Robertson's terms) to appraise this review would probably cater only to rare antiquarian interest. For that rare case, the "headmaster" may perhaps be permitted one lapse into bad manners: to confess that Robertson has voiced many criticisms and evaluations of the several papers which the editor felt keenly but suppressed for the sake of decorum.

On the three papers constituting Part II, it will be necessary to bypass in the limits of this review the two occasional essays on "What Has Happened to the Rate of Interest" (December 1948) and "British National Investment Policy" (January 1952). Many of the author's *obiter dicta* transcend occasion, however. "We have got to the stage of admitting that it may sometimes be decent for wages to stop rising and for prices actually to fall, though the admission has still to be wrapped up in layers of witch-hunting formulae about wicked entrepreneurs" (pp. 95-96); and "a State which claims to control the rate of capital growth has undertaken a function for its precise manner of discharging which it will always find it difficult to offer any convincing explanation . . ." (p. 118).

The *pièce de résistance* of the volume, in many ways, is "Some Notes on the Theory of Interest," reprinted from the Williams honorary volume. Robertson supports the view that if net investments are being made, the marginal productivity of capital *always* stands above the rate of interest, and the rate of interest *always* stands above "myopia" or the marginal rate of time preference. If Robertson's first inequality means that there could be neither net saving nor net investment if (using Wicksell's terms) the natural and money rates of interest are equal, a good many contemporary theorists—rightly, I believe

—would disagree. Let the reader review Myrdal's critique of Wicksell's three criteria of equilibrium in *Monetary Equilibrium*, particularly the last pages dealing with the money-natural rate criterion.

Robertson's second inequality, the excess of the rate of interest over the marginal rate of "myopia," said to be necessary for net investment, involves two difficulties. In the first place, does this or does it not imply that even without net investment a positive rate of interest would be necessary to overcome marginal myopia (or time-preference)? In other words does "real myopia" entail a positive interest rate in a stationary economy? And if so, what gives myopia this characteristic? In the second place does myopia or time preference give hostages to the fallacious idea that saving is just "postponing consumption"? Are they rational or irrational, the latter being implied at the end of page 99? Do they have *any* meaning not better conveyed by the perfectly colorless phrase "the supply schedule of saving"?

Other parts of this essay, dealing with Keynes' liquidity preference and Kaldor's speculative theory of interest and Cassel's contributions, move upon firm terrain.

In Part III, the very short essay on the Terms of Trade will be perennially valuable for its lucid differentiation of various meanings of this term, and of the gains from the terms of trade and the gains of trade in general. But it would be too laborious to note all of the contributions of this small volume to theoretical insight and to practical common sense. These qualities are not quite separate matters from a sense of humor and a sense of modesty. Consult in the index the items "Tweedledee" and "Tweedledum" for one example among the many.

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The Political Economy of Monopoly: Business, Labor and Government Policies. By FRITZ MACHLUP. (Baltimore: The Johns Hopkins Press. 1952. Pp. xvi, 544. $5.50.)

The Economics of Sellers' Competition: Model Analysis of Sellers' Conduct. By FRITZ MACHLUP. (Baltimore: The Johns Hopkins Press, 1952. Pp. xx, 582. $6.50.)

Professor Machlup's volumes on the economics of monopoly and competition will be highly appreciated by professional colleagues and students alike. These books may perhaps be viewed as two volumes of a single work even though the decision concerning the sequence of the volumes would have to be somewhat arbitrary. The general reader and the student of general economics will be interested mainly in *The Political Economy of Monopoly*. The book on sellers' competition deals with problems which are of interest primarily to the theorist and to the more advanced student who wishes to acquire proficiency in the theory of market relations. In one sense the book on monopoly is a more elementary "first volume" since some of its early sections may serve as a simple introduction not only to the volume itself but also to the theoretical analysis which is found in *The Economics of Sellers' Competition*. Yet in another sense the book on monopoly is the "second volume" without which

the work would be incomplete even for professional readers. It engages much more in the appraisal of *directly* significant problems than does its companion volume which is of "instrumental" character in that it presents, illustrates and further develops a technique of analysis.

The author's appraisal of market tendencies and of government policies is presented in such a way that the reader of *The Political Economy of Monopoly* becomes well acquainted not only with the author's views but also with the factual background of the problem and with the main arguments that can be advanced for and against Machlup's position. This is a substantial merit. The book contains excellent brief summaries of information on the degree of concentration in various industries, with the proper discussion of the fictitious accuracy involved in the data; of the history of anti-monopoly legislation and the significance of mergers; of existing pieces of legislation which promote producers' monopoly; and of labor policies and legislation. The specific conclusions which Machlup derives from this information will not be shared by all readers. But this will not limit the usefulness of the book because the summaries are sufficiently general to make it obvious that subjective judgment is required for reaching final conclusion.

Machlup is aware of the fact that no scientifically documented statement can be made on how much of the existing degree of concentration in the various industries is required for keeping them at a given level of economic efficiency. But while he acquaints us with both sides of the argument, he is nearly always willing to give the benefit of the doubt to the antimonopoly side. Multiplant expansion can in his view be accepted as an almost dependable sign of the growth of a firm beyond the size required for maximum efficiency on a given level of technology; substantial reduction of concentration would almost certainly have a favorable effect on further technological progress; and the reduction of competition in atomistic groups of producers by government interference is almost always unjustified. Hence Machlup suggests not only the vigorous enforcement of the present antitrust laws but he looks favorably also on strong additional measures for reducing the degree of concentration. These include tax policies which treat small enterprise more advantageously than the oligopolistic, and which discourage the accumulation of undistributed profits; freer international trade; a ban, with some exceptions, on intercorporate stockholdings; substantive patent reform; and possibly direct limitation of firm-size. Unionism he takes for granted but he feels that the noncompetitive character of the labor supply might make it desirable to regulate wages by government policy based on definite rules. Thus, in an economy with a stable general price level and high employment, the general level of money wage rates could be made to rise gradually in accordance with over-all economic productivity, while wage rates in specific industries would be allowed to increase at a greater or smaller rate according as there exists labor shortage or unemployment in a specific sector. By such regulation the misuse of monopoly power by unions could be avoided.[1] Antici-

[1] Machlup is inclined to the opinion that the relative share of labor in national income has shown a rising tendency but argues that this need not be a consequence of union activity because the stock of capital has risen more rapidly than the labor supply. If we consider

pating strong political resistance to such a scheme, Machlup describes the limitation of individual unions to specific areas as an alternative measure which would fit into his competition raising program.

In some ways the antimonopoly convictions of the reviewer are less general than those of Machlup. The agreement is complete as to the generality and the significance of the case against business practices of a "predatory" and "discriminatory" kind which by their very nature have the consequence of "artificially" excluding efficient rivals.[2] However, oligopoly that would survive a truly complete suppression of such practices presumably results from real economies of scale. The reviewer, unlike the author, doubts very much even the "theoretical possibility" of eliminating nearly all oligopoly power without sacrificing important technological and organizational economies. It is difficult to imagine fiscal or similarly general policies which would be based on the distinction between such concentration as is required for social efficiency and such concentration as is not. Also, to the reviewer comprehensive wage regulations seem undesirable in economies not operating under a rigid full-employment guarantee; and the alternative proposal to reduce the size of unions would, in his opinion, not change the inflationary potentialities of full-employment periods (nor the long-run trend in income distribution which seems dominated by forces other than unionism). But even readers who dissent from Machlup in these or in other respects should agree that he has presented us with a most lucid, useful and interesting discussion of the factors which must be weighed by anyone desiring to develop an articulate attitude toward problems of antimonopoly policy.

Turning now to *The Economics of Sellers' Competition* we should call attention to the subtitle of the volume which characterizes the author's method. He develops in this book a "model analysis of sellers' conduct." This book examines the consequences of sellers' behavior under alternative market conditions, on the working hypothesis that certain characteristics of these market relations and of entrepreneurial motivation are observable in pure form. Such model analysis can of course give only more or less realistic results. Some readers will place the emphasis on the *more*, others on the *less*, as we know from the extended controversy on marginalism in which the author of the book has played a leading rôle. The reviewer agrees that the traditional

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long-run tendencies for the United States since 1920, limiting ourselves to privately produced income before direct taxes, and if we correct for the changing weight of employees in the labor force, I see no basis for the opinion that the relative share of employees has tended to rise. Various published statements by British economists suggest the absence of such a long-run trend for Britain too. In general, the effect of union-induced wage increases on the share of labor may well have become offset partly by price adjustments and partly by induced labor-saving innovations.

[2] Long-run social efficiency considerations may favor "artificially" excluding rivals who in a free market could be successful entrants at any moment of time. Patent legislation exemplifies this proposition. But it is not possible to develop a reasonable argument which would maintain that the social interest requires letting private groups practice "artificial exclusion" as they see fit. In some instances it is easy, in others difficult, to diagnose in practice a business policy as involving artificial exclusion of potential entrants, but the case against such policies seems entirely general to the reviewer as it does to the author.

method of which Machlup is a staunch defender remains significant. We lack analytical systems which would be sufficiently complete to permit of the quasimechanical use of theories for the explanation and the prediction of economic processes. The traditional method of rigorously analyzing simplified or purified processes in ideal models calls for *ad hoc* (informal) adjustments when we are concerned with real cases to which the assumptions apply merely with modifications. But while the method has been severely criticized on these grounds, it remains a fact that important insights have been derived from this type of analysis. In price theory so far no alternative models have emerged which, on a high level of generality, would yield less crude first approximations than those obtainable from the usual concept of market relations and the profit principle. Some of us may feel that Machlup occasionally underemphasizes (plays down) the limitations of the method of "strong cases" but no reader can justly accuse him of failure to call attention to the idealized or purified character of the situations with which he is dealing.

For oligopolistic markets the results of such analysis depend on particular assumptions concerning the nature and the extent of cooperation (collusion) between rivals. However, it is possible to describe main types of cooperative arrangement, and also to formulate reasonable hypotheses as to how the degree of cooperation typically varies with the characteristics of the industry demand (*e.g.*, its stability or predictability) and with other observable market characteristics. Machlup distinguishes carefully between different kinds of "cooperation" or "collusion" and gives a very revealing discussion of alternative types of oligopolistic coordination as well as of varieties of oligopolistic warfare.

The specific discussion of markets with atomistic and oligopolistic properties, with homogeneous and heterogeneous products, and with free and limited entry, is constructive, lively and systematic. The bearing of entry on market results is strongly emphasized. Quality competition and competition in sales effort receive detailed attention, as does of course price competition. Furthermore, in the course of his analysis Machlup directs his readers' attention to problems which frequently are overlooked or are relegated to other areas of economic theory. These include, among others, the nature of profit and rent concepts, the possibility or impossibility of extending the specific equilibrium theories relating to alternative market structures in the direction of general equilibrium theory, the historical race between diminution of the regional (spatial) monopoly element and increasing firm-size. While Machlup makes interesting observations concerning the effect of market relations on the rate of technological and organizational progress, the treatment which this problem receives is not commensurate with its significance.

In these two volumes Professor Machlup offers much in the way of clarification and individual contribution that will prove of considerable interest to the specialist. If to achieve this had been his only objective he could have expressed his ideas in fewer pages. However, at the same time, he wished to explain basic concepts of economic theory and also the content of his own contribution to other categories of readers, particularly to students. Yet I feel that on balance it would have been advantageous to shorten *The Eco-*

nomics of Sellers' Competition. Detailed explanation and illustration do of course help the reader, especially the relatively least expert group of readers which here will consist of advanced undergraduates. But the book inevitably presupposes the kind of interest in formal theory which, if it is real, goes with the ability to follow a more condensed presentation of problems. So far as classroom use is concerned, instructors will not find the book indivisible but they might not find it very *easily* divisible into more or less important sections, and the volume is too long for being used *as a whole* in a theory course which must include several other subject matters of great significance. On the other hand, I feel that it would have been unwise to shorten *The Political Economy of Monopoly* because the space which the book occupies as well as the author's expository skill is required to make the subject intelligible to a group of readers which in this case is potentially much wider. As for classroom use, here it does not matter much that in general courses there will be no time for working through the whole volume. Some instructors will want their students to know more about certain aspects, others about other aspects of the monopoly problem.

What really matters is that both books contain a wealth of material from which readers of many kinds may make selections to their substantial benefit.

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Psychological Analysis of Economic Behavior. By GEORGE KATONA. (New York: McGraw-Hill. 1951. Pp. ix, 347. $5.00)

So wide a field is encompassed by this book that a reviewer must resort to selective generalization, and this is fostered too by the long time that has elapsed since its publication. At this distance, the highly valuable pioneer job that Katona has done yields three major types of insight, and they concern basic problems in economic investigation and analysis that any serious practitioner must feel a need to consider. First, when the actor in economic life is man as modern psychology sees him, rather than the convenient figment—economic man—the job of the economist is altered and Katona indicates how. Second, certain familiar economic problems are considered in a fresh light. Finally, the changed job means a changed order of usefulness of various tools of study, and consequently methods are discussed explicitly and implicitly throughout the book.

On the first score, man is presented in the light of field and Gestalt psychology. Freudian insights, Katona believes, are, though valuable, not essential to the explanation of the economic behavior of groups. The mechanistic stimulus-response sequences of behaviorism are largely rejected. Man's objectives and motives are complex functions of the innate and the acquired. The organization of his behavior takes place within the psychological "field." "The field encompasses people's views of the past, their perceptions of the present, and their attitude toward the future" (p. 174). A notable aspect of this conception would seem to be that varying degrees of certainty and uncertainty are part and parcel of it. It means that the economist "instead of relating the environment to economic processes" directly, must "study the

relation of the perception of the environment, and of the perception of changes in the environment, to organized behavior" (p. 31).

What this basic injunction implies is then illustrated by treatment of a number of important economic problems. For most of them—investment, business cycles, and (in a particularly interesting chapter) profits—lack of pertinent data limits the discussion primarily to analysis. Even so the subjects are for the most part enriched by the insights that Katona brings to them, at the same time that his talent for the homely and concrete succeeds in making the discussions nicely illustrative of his general point. But in the section on consumption, especially on consumer saving, important empirical evidence is presented. The basic data were developed in extensive interviews of individual families done under Katona's direction at the Michigan Survey Research Center. Of the likely factors that might influence saving, information was collected about a number of economic ones—income, past income, purchases of durable goods, and holdings of liquid assets. But the theory also requires that perceptions and attitudes be studied, and consequently "attitudinal" variables—such as expectations about general economic conditions and future income, prices and purchases—were also included. Though I hold with Katona that subjective attitudes must affect economic actions, the showing of the surveys on this score does seem disappointing. I experience some difficulty in evaluating the data because of the failure to present information separately for relatively narrow income groups. Nevertheless, it seems clear that compared to the dramatic influence of major purchases of durables on saving (Tables XXX and XXXI), expectations play a picayune role (Tables XX and XXIX). Is the difficulty one of definition or of failure to differentiate between weakly and strongly held expectations or between those based on the economic scene rather than the stage of the family life cycle? Certainly these studies, like most good research, raise as many questions as they answer.

Finally, the book has much to say, implicitly and explicitly, about method. For when actions are caused by a wide variety of both subjective and objective factors, which are nevertheless believed capable of measurement, the proper way to study them is bound to differ from that appropriate to a world mechanistically conceived. For one thing, the complexity of relevant causation means that it is essential in economic analysis to proceed primarily from the particular to the general. Consequently, micro-economic studies assume critical importance. More specifically, "economic-psychological surveys" are advocated and described in several important sections. But only with some qualifications can analysis proceed from the particular to the general. For in studying "the factors contributing to specific decisions made under certain conditions, instead of attempting to arrive at generally valid answers regarding the how and why of all business procedures, . . . analysis is in need of guiding lines and hypotheses" (p. 214). One source of such guides is economic theory; another is psychology. From the latter, Katona derives a guide of which he makes extensive use—the dichotomy between acts involving habitual behavior and those entailing true decisions. I must say I find this a most unfortunate choice, in which the basic fact that most acts involve important elements of

both the habitual and the elective is lost. Corresponding distortion of economics seems to result. Similarly unfortunate is the sharp juxtaposition of decisions based on "sizing up" a situation and those based on "detailed calculations made on the basis of definite expectations, or of a range of probability distribution of expectations, or marginal calculus" (p. 249), which may constitute a projection into economics of the basic notion of Gestalt psychology. A similar cramping of economics may have resulted if the apparatus of the psychological field was responsible for turning the weight of attention from examination of how decisions to purchase (and then when to purchase) major consumer or producer goods evolve. Though Katona recognizes the importance of such work, especially in the field of investment, discussion actually does center on decisions or expectations as they exist at a particular time, however affected by visions of the past or future.

These are almost necessary weaknesses of first experiments with a difficult approach. And they are themselves instructive: they urge the importance of borrowing from psychology only basic quite noncontroversial conceptions, leaving lesser or newer ones to be used only when their applicability in a particular context is subject to test. It should then be possible, by virtue of severe abstemiousness, to make the marriage of psychology and economics one in which troth is pledged for better only. For better, certainly, is the utilization by economists of the skills of psychologists in framing and carrying out studies and in eliciting outside cooperation when this is required. For better, most clearly, is Katona's basic notion, the implications of which he demonstrates so forcibly, that man's perceptions, attitudes and structuring of external reality are a prism through which the light of economic fact must pass before it activates response. This notion must deepen and broaden economic work wherever it penetrates.

RUTH P. MACK

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L'objet de l'économie politique. By HENRI GUITTON. With *Observations* of Léon Dupriez and Francesco Vito. Bilans de la Connaissance Économique, Vol. II. (Paris: Lib. Marcel Rivière et Cie. 1951. Pp. 200. 450 fr.)

The amorphous philosophical discontent about the scope, rôle and nature of political economy has not yet called forth much writing in the Anglo-Saxon countries. Elsewhere the situation is different, and this volume is an excellent representation of what might loosely be called the economic viewpoint of a certain section of continental Europe. Most economists will find it difficult to understand many of the concepts in their application to political economy, *e.g., science morale.* Much less will they sympathize with them. This should not be enough to condemn the book, for the problems of ethics, morality, and the ultimate ends of man have always occupied political economists even though they usually exclude this speculation from their economic writings.

The title of this book has been rendered elsewhere as *The Object of Political Economy.* This is misleading. Since the French word *"objet"* is so rich in meaning it is only fair to the authors to note their connotation of

"subject matter" or, in German, *"Gegenstand"* or *"Inhalt."* The heart of the book is an interesting discussion of about one hundred pages, quite in line with the title, by Professor Guitton of the Faculty of Law of the University of Dijon.

After a brief introduction the first section is devoted to a rather critical review of various conceptions of political economy, dominated by what the author calls the image of the physical sciences. Writers in this vein, like Fisher, Nogaro, Pareto, Marshall and Weiser, are generally held to feel that political economy is like the other sciences, *"amorale, générale, indifférente."*

In the second section and conclusion, Guitton sketches his conception of the new and developing concepts in this field. Very briefly, the new science of economics will be one of the first *"sciences supérieures"* which will work out its own new techniques and become practically a new type of knowledge. His attempt is one of synthesis that will aid this development leading to a new human science of action. This is not held to be entirely in opposition to the older conception because writers often have expressions of both ideas in their works. It is maintained that perhaps our most urgent task is that of developing our science to be better adapted to the present and future. Unfortunately, despite the forcefulness of the plea for such a science, not much is said about how it could be achieved.

Both Dupriez and Vito agree in the main with Guitton. Dupriez, professor at the University of Louvain, emphasizes three questions: the rôle of rationality in economic activity, the value of certain analogies, and the normative character of economics. One of his conclusions suggests the viewpoint of the welfare economists—we must judge economic activity increasingly from the point of view of the group rather than from that of the individual. He goes further than most of them when he speaks of *"l'intervention politique."*

Professor Vito, of the Catholic University of the Sacred Heart of Milan, continues the discussion of rationality in economics but in the unusual way of attempting to define what irrational activity might be. He concludes by stating that there are already signs of a transition from *"neutralité"* to *"humanisme."*

The annotated bibliography, a feature of the series, has been expanded in this volume to include articles. This section of more than one hundred items is alone enough to make the book valuable. It includes works in at least five languages representing all important schools of thought.

Professor Guitton has achieved his goal of a synthesis. The success of this achievement can be evaluated only in terms of the value system of the reader. Even those who do not share the opinions of the author will find the book provocative.

PETER R. SENN

Wright Junior College, Chicago, Illinois

Die Konkurrenz und ihre Fehlentwicklungen, Untersuchungen über die Störungen der Marktwirtschaft. By BURKHARDT RÖPER. (Berlin: Duncker & Humblot. 1952. Pp. 243. DM 14.60.)

This monograph by Röper, a younger member of the faculty of the Univer-

sity of Hamburg, concerns itself with the competitive market economy and its maldevelopments. The exposition is simple, nonmathematical, consciously avoiding much modern refinement, though aware and appreciative of basic modern literature. Monopoly and oligopoly, into which competition shades, are presented in the traditional manner and "dynamized" only by considering long-run population increase and long-run increase in satisfaction of wants through technological progress. Monetary and cyclical changes as well as problems of government intervention are excluded.

The author starts leisurely in the German manner to investigate *"Das Wesen der Konkurrenz"* discussing similarities and dissimilarities of competition and foot races, tracing the origin of the simile dutifully to Cicero who in turn has ascribed it to the Stoic Crysippos. The author ponders whether a comparison with horse races may not be preferable as they depend not only on the skill of the jockey but also on the financial ability to buy the right horse. Pure and perfect competition are defined in the customary manner and the static welfare maximum under competition using the Lerner criteria is shown. A rather general discussion about the relation between model and reality follows.

Maldevelopments—the main topic—are defined as endogenous economic developments which, in a competitive economy with growing population and increasing level-of-want satisfaction, interfere over the long run with the optimum satisfaction of individuals and hence with aggregate welfare. Enumerated and briefly discussed are: excessive price rigidity, excessive price flexibility, delayed cyclical price reaction (cobweb theorem), anomalous price reactions (backwards sloping supply curves); then, loose relations between price and cost, divergence between private and social revenues and costs (external economies and diseconomies), peculiarities of factor supply; finally, structural over- and underdevelopment on the fringes of the public sector and the problems of depletable natural resources and enterprises too small to employ one person fully are discussed. This is followed by some rather inconclusive remarks on income distribution, high distributive cost, and advertising. The concept of ruinous competition, on which the *Reichsgericht* based its appraisal of fairness of cartels over fifty years ago, is justly criticized.

A "realistic" (*wirklichkeitsnahe*) and "dynamic" theory of monopoly and oligopoly is attempted as best fitted to a reality shading from competition into the other market forms. Only the sellers' side is examined, though even moderate realism ought to pay attention to bilateral monopoly and its kin. Essentially, changes in cost and demand over time in regard to profit maximization are considered, though the familiar phenomenon of charging less than the full monopoly price for fear of government or intrusion of newcomers is also treated. "Competitive Monopoly," that is, monopoly which continuously lowers its prices and cost, though not necessarily total profit, is suggested as the prevalent type of industrial monopoly. The phenomenon is due largely to long-range competition from substitutes and long-range fear of newcomers. In the area of oligopoly the prevalence of compromise, not hostility, between sellers is suggested as most likely. Kinked demand curves are used to show the consequences of group discipline.

The author undertakes to analyze long-range changes through a three dimensional graphic presentation. It uses conventional money and quantity axes, and time as a third axis so as to give in depth the changes of demand and cost curves over time. This method of graphic presentation only accentuates, it seems to me, a fundamental weakness of the author's well-intentioned attempt to achieve realism by introducing changes over time. The traditional Marshallian curves do not refer to periods of real time but to partial abstractions from reality in regard to time periods under consideration by the seller. By setting up families of traditional marginal and average cost curves for different time points, not much is achieved. In the sellers' and buyers' minds, momentary short-run and long-run considerations and expectations are present in some undefinable mixture at any moment of time. This makes it impossible to add up, so to speak, simple graphs, in order to achieve greater realism.

The book is an attempt to grapple in a reasoned though hardly original way with competition in relation to the social order (welfare). Many relevant issues are surveyed. Consideration of the concept and requisites of workable competition would have put the discussion on firmer ground; J. M. Clark's classic article is quoted but not adequately considered. It must be surmised nevertheless that the book will be of value to the German reader, though it discusses matters quite familiar in this country. In the present state of the doctrine it should not be held against the author that he has not applied the refinements of modern Anglo-American welfare economics. The time-honored practice of developing *ad hoc* criteria arising from policy suggestions by students of concrete problems—has been recently recommended also by an experienced and representative practitioner of modern welfare doctrine (see M. W. Reder in B. F. Haley, ed., *A Survey of Contemporary Economics*, Vol. II, p. 36).

WALTER FROEHLICH

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A Review of Economic Doctrines 1870-1929. By T. W. HUTCHISON. (Oxford: Oxford University Press. 1953. Pp. xiv, 456. $6.00.)

Mr. Hutchison's present work is indeed a *review* and not an exhaustive treatise. In one volume of 430 pages of text he deals with the contributions to economic science of approximately eighty persons, whose works account for the evolution that took place in economics during this sixty-year period. In most cases the contributions in question are discussed at sufficient length and penetration to convey a clear idea of the essence of their doctrines as well as a perspective on the impact of the latter on the growing corpus of economic knowledge. Yet the work of some writers who become important toward the end of the period—for instance Davenport, Pigou, J. M. Keynes, Bowley, Mitchell, and J. M. Clark—receives very hasty analysis and sometimes only passing mention. This raises a question as to the wisdom of dealing with so many economists in one volume. What the *Review* gains in scope and in

ability to exhibit the rich variety of doctrinal efflorescence that occurred has in some cases been obtained at a sacrifice of desirable intensity of treatment. Yet this may be of minor importance because he refers repeatedly to more extended analyses of most of the economists he mentions, which are now available in the doctrinal and biographical works and essays of such writers as Schumpeter, Keynes, Hayek, Homan, Viner, Marget, and others.

Hutchison's *Review* stands out from other works dealing with the same period in three respects: (i) a certain novelty of expository arrangement, (ii) the attention given, despite space limitations, to several neglected writers of surprising originality, and (iii) the excellence of its "synoptic" text-sections, which yield perspective on the main trends of doctrinal development and on the relations between the several schools of thought of this period.

The *Review* is divided into three parts. Part I, "The Architects of Equilibrium Economics and Their Main Critics," is arranged by individual economists and schools; it occupies about two-thirds of the volume. Here Jevons, Sidgwick, Marshall, Wicksteed, Edgeworth, Hobson, Menger, Wieser, Böhm-Bawerk, Walras, and Pareto receive a chapter apiece. Mangoldt, Schmoller, Wicksell, Cassel, J. B. Clark, Veblen, Newcomb, and Fisher get about half a chapter each, and smaller sections are devoted to Roscher, Knies, Launhardt, Auspitz, Lieben, and Schumpeter. Both Part II, "From 'Static' to 'Dynamic' Analysis," and Part III, "The Economics of Instability and Disturbance" are arranged by topics. Part II records the exegesis Marshallian and Walrasian equilibrium economics underwent in the course of critical scrutiny. The separate chapters are on welfare economics; micro-economics; profits and uncertainty; and interest, money, and macro-economics. Part III has chapters on "Crises and Cycles: before 1900," "Crises and Cycles: from 1900," and "Economists and the Problem of Unemployment in Great Britain, 1885-1929." Parts II and III unavoidably overlap somewhat with Part I because some of the ideas of writers dealt with in Part I are here repeated in summary form and placed in juxtaposition with theories of many additional writers on the topics in question. However, students may find this partial repetition helpful.

Reserving comment on Part I for the moment, this reviewer finds that Parts II and III go over ground that should or will be familiar to students after exposure to chapters on similar subjects in such sources as Stigler's *Production and Distribution Theories,* the American Economic Association volumes *Survey of Contemporary Economics,* Hansen's *Monetary Theory and Fiscal Policy,* his *Business Cycles and National Income,* etc. The advantages of Hutchison's treatment compared with those of the foregoing sources are its greater compactness and the fact that he surveys the work of more writers in tracing each of his topics back to J. S. Mill or beyond and forward into the early 1930's.

In Part I, Hutchison's treatment of his British forebears is generally well balanced and interesting. His discussion of Marshall's work on money, however, leaves something to be desired because it is not clearly linked up with subsequent monetary theory, almost as if Marshall's efforts in this realm

exerted little or no influence on his contemporaries and students. To be sure, in the proper places it is shown that Pigou, Robertson, Keynes, and Hawtrey, etc., were nurtured on Marshallian notions about money. But in the case of Keynes and his *Treatise on Money*, it is also shown—and something similar is implied in the other cases—that he had to break through Marshall's preoccupation with currency reform and turn to Wicksell and others to come to grips with monetary theory proper. This raises the question whether any outstanding economist carried on more directly in Marshall's footsteps. Of course, at least one did, namely Irving Fisher, who acknowledged that his "compensated dollar" proposal for stabilizing prices was an outgrowth of Marshallian ideas by saying that: "the proposal which is here tentatively suggested . . . involves a combination of the tabular standard with the principles of the gold standard" (*The Purchasing Power of Money*, 1922 ed., p. 337). Yet Hutchison ignores this and leaves the reader with the impression (pp. 270; 274; 334-35) that Fisher's monetary work derived from the treatise on "The Societary Circulation" in Newcomb's *Principles*. To be sure there was a strong link between Fisher and Newcomb in the analysis of the quantity theory and in their equations of exchange, but the reviewer submits that there was probably as close a doctrinal link between Fisher and Marshall in matters of monetary policy and reform.

Hutchison's chapters on the Austrians are excellent and comparable with his adept treatment of the British. His fine performance on two schools of such different orientation especially towards economic policy leads one to expect him to explain this difference and to trace it back to its doctrinal origins in Menger's elaborate conception of "the nature of goods" as distinct from that of "claims." Apart from contrasting the value theories of Jevons and Menger, this problem is largely ignored. One can only suggest here that Menger's "goods"-doctrine, which tended to exclude "claims" from economic analysis, was adopted by Böhm-Bawerk, and was later carried over from Austrian capital theory to monetary and fiscal analysis where it hampered progress by basing the latter on barter-economy postulates.

Hutchison's characterization of Wicksell's capital theory—originally a reconstruction of that of Böhm-Bawerk—as ". . . ingenuity . . . largely wasted . . . [on] a blind alley" (p. 234), will not be taken seriously by those who have familiarized themselves with Wicksell's own, final capital-structure concept (*cf. Lectures-I*, pp. 151-65; 202-06, and Appendix 2; and also Lindahl's *Studies in the Theory of Money and Capital*, Part III, which supplements Wicksell's work). Moreover, contrary to Hutchison's impression (p. 234), Wicksell abandoned his vulnerable investment-period quantification of capital for his viable structure concept, and in 1919 he also retracted his earlier objections to Walras' formulation of capital theory (*cf. Lectures-I*, Appendix 1, pp. 236-37 and 226-27 in the order given here).

On the other hand, one can not complain about Mr. Hutchison's competent discussion of Wicksell's monetary theory, although one might wish that more of it had been centered on the later analysis in *Lectures-II* than on that of *Interest and Prices*.

A real virtue of Hutchison's *Review* is that it brings out the contributions of several economists whose works rarely receive mention, to say nothing of the attention they apparently deserve, in standard texts on economic doctrines. As if to make up for this neglect, the author has devoted many hard-to-spare pages to such neglected German and Austrian writers as Mangoldt, Schäffle, Launhardt, Auspitz, and Lieben; to Americans such as Newcomb, Hawley, Crocker, and Johannsen, and to Englishmen such as Sidgwick and Foxwell.

It will probably surprise most readers, as it did the reviewer, to find, for instance, that Mangoldt in the 1860's, when the German historical school was dominant, was a theorist of major caliber with a value theory reminiscent of Marshall's and a monetary analysis foreshadowing that of Wicksell; that Johannsen in 1903 anticipated some of Keynes' work both in *Treatise* and in *General Theory* with his astute analysis of the impact of saving on income and employment and with his multiplier principle; that, in the 1870's and 1880's, Schäffle, Sidgwick, and Foxwell alike were groping for definite criteria for economic policies for steering a "middle course" to higher levels of general welfare by mitigating and removing the evils of unrestricted competition and stemming the greatly feared tide of socialism.

The *Review* opens with a chapter on "political Economy in England After 1870" which describes the condition of orthodox economics on the occasion of the centenary of *The Wealth of Nations.* Few accounts of the culmination and decline of the classical school are more lucid than this. Similar, shorter accounts describe the state of economic thought around 1870 in Germany and Austria, in France, and in the United States.

We do not wish to bring this review to a close without paying tribute to Hutchison as a most scholarly and competent guide to the economics of 1870-1929. His writing, amply documented for the benefit of serious students, shows clearly that he has read and reflected at length on the original works of the many writers he reviews, as well as on the pertinent commentary literature that has sprung up around them through the years. This fully justifies the confidence most readers will place in his judgment when his discussion takes them into unfamiliar territory. His *Review* merits wide and serious reading mainly as an outstanding treatise, not merely "another text."

CARL G. UHR

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A History of Economic Thought. By JOHN FRED BELL. (New York: Ronald Press. 1953. Pp. x, 696. $6.50.)

Professor Bell's work begins with the recognition that "there is a definite need for a volume that provides a unified approach, a manageable organization, and breadth of coverage so that the diverse materials in the history of economic thought may be more easily summarized and integrated" (p. v). In keeping with these objectives, the reader is presented with a volume of unusually broad scope; one notes in particular the completeness of the discussions of the cameralists, the minor American economists of the nineteenth

century, and the nationalists, romantics, and optimists. Unfortunately, the further pursuit of his goals is crippled by the author's reluctance to arrive at systematic generalizations—a reluctance traceable to his feeling that "it is a dangerous and somewhat unprofitable pastime to attempt to classify economists or place them in 'schools'" (p. 658). As a consequence, breadth of coverage is frequently associated with tedious and diffuse treatment, while a meticulous scholarship spends itself in tracing minutiae such as the pedigree of the phrase *laissez faire*, or the literary history of Quesnay's *Tableau*.

In its organization the work follows the conventional chronological plan, beginning with the Bible, the Greeks and Romans, and medieval thought. The emergence of modern economics is found in the mercantilists, the cameralists, and the physiocrats. The major portion of the volume is then divided into parts dealing with classical economics, the critics of classical economics, marginal utility economics, economics in the United States, and concludes with a discussion of "Main Currents of Economic Thought in the Twentieth Century." The central focus around which the evolution of thought is built consists of a thorough treatment of Marshall's *Principles*, from which stems much of the author's position as to the nature and rôle of economics. Yet even here one could ask for a more complete recognition of the limitations of Marshall, especially in the light of recent developments in both aggregative and dynamic economics. Closely related is the social outlook that colors much of the book. Bell asserts that, while capitalism is wasteful, and is characterized by periods of unemployment, "regrettable as this is, it seems preferable to complete surrender to government . . ." (p. 662). This seems a rather overdrawn picture of the alternatives to place before the student.

From a pedagogical standpoint the book, in spite of its encyclopedic character, suffers both from the author's cramped style and the diffuseness of treatment to which his method condemns him. Furthermore, one must note a prevalence of doubtful interpretations and statements of fact, both in the tracing of ideas and in their historical setting. We are informed, for example, that by the last quarter of the eighteenth century "the corporation as a form of doing business . . . was firmly established" (p. 149). The meaning and significance of classical economics is blurred by the author's view that "the economics of Adam Smith and the classical group was largely objective or exchange economics of the market place" (p. 9). On this basis he contrasts the classicists, assumed to be interested primarily in price, with the marginalists, who instead are concerned with value as such. This misconception of the rôle of value in classical economics is broadened into the time-worn comparison of the labor-command and embodied-labor theories of value in the works of Smith, Ricardo, and Malthus, with no clear reference to the contexts in which the theories are used and without which the distinction cannot be illuminated for the student. Marx is dismissed as having "added little or nothing to the broad development of economic thought" (p. 656); presumably the concern of Joan Robinson, Domar and others with Marx is misplaced. In his discussion of Keynes, Bell becomes involved in a confusion as to the

nature of technical "macro-economics," which he first relegates to the abstract status of "a sort of general equilibrium concept," yet almost in the same breath accuses of regarding *laissez faire* as "a completely untrustworthy philosophy" (p. 601). More specifically, "those who went overboard in embracing Keynesian doctrines without qualifications" are charitably invited "to return to the fold of price theorists" (p. 658). One wonders how many would be surprised to find that they had ever left the "fold." Certainly Keynes himself did not regard the *General Theory* as a replacement for price theory.

ROBERT CAMPBELL

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Fundamentals of Political Economy. By DEAN A. WORCESTER, JR. (New York: Ronald Press. 1953. Pp. xv, 594. $4.50.)

Professor Worcester has written an introductory text for a one-semester course in economics that stresses problems and policy. Believing that "more economics can be absorbed in an introductory course if it begins with what the students already know and are interested in and then works toward unfamiliar and, therefore, unappreciated areas" (p. iii), he has tried to save the unwary student from the pitfalls of rigorous analysis.

The book is divided into five parts. Part I establishes the functions that any economy must discharge and examines them briefly in the context of (1) a centrally administered economy and (2) a market economy. Part II considers the problem of efficient production and contains chapters dealing with the measurement and distribution of income, the effects of government and trade unions on the creation of income, and the utilization of natural resources. Part III is concerned with the problem of stable prices and full employment. Here the author treats international trade, money and banking, fiscal policy, and the business cycle. Part IV is devoted to industrial organization, monopoly, and governmental regulation of business and labor. In Part V the text is concluded with a discussion of progress in terms of population changes and the quest for security.

Students who read this text will brush up against numerous vital and challenging issues: the threat of central planning to democratic values, the comparative merits of private and public health insurance schemes, the problem of price and profit control, the adequacy of governmental policy with respect to the maintenance of full employment, the effect of large-scale industry on the enterprise system, to name but a few. This reviewer has little doubt that the text will quicken the interest of students in these and similar issues, but he is not quite so sure that they will have acquired a sound basis for understanding them. The author has deliberately eschewed a systematic analysis which might have been used to probe the problems he raises. Instead he has chosen to introduce theoretical concepts when he has felt that "what the students already know" is inadequate. Thus in the chapter on Functional Income Distribution, Worcester has felt constrained to introduce the marginal productivity

theory of wages. The theory is illustrated by a neat and simple numerical example, but the blow is still a heavy one. The students have not been prepared in the previous chapters by an explicit treatment of marginalism. Again, in the chapter on Fiscal Policy and Business Activity he has found it appropriate to develop income analysis briefly—the equation of exchange which previously he had been relying upon apparently being inadequate for the issues at point. But in this brief treatment he explains the equilibrium level of income in terms of the equality of planned savings and planned investment, which necessarily involves him in an explanation of the discrepancies in savings and investment, *ex post* and *ex ante*. These concepts are not objectionable—the point is that the student comes upon this obstacle without warning and without having been conditioned to surmount it.

Not only does the piecemeal introduction of theory make it difficult for the student to grasp theory when he does encounter it in the text, but it sometimes leads the author to discuss problems for which there has been inadequate preparation. For example, this reviewer doubts whether the following statement about monopoly will have much meaning to the student who is not acquainted with price theory: "They find monopolies directing resources from more valuable uses into less important uses and holding them there, thus frustrating many consumer wants and making the economic system less flexible and adaptable to changing conditions" (p. 487). Later, in a discussion of the agricultural problem the author refers to the demand for food as being inelastic (p. 546), but there has been no previous discussion of price or income elasticity.

The great virtue of the text is that it is interesting. This is no mean achievement in a day when the typical text has remarkable powers of inducing sleep. Throughout the book Worcester has carried over the theme of Part I and has compared some of the organizational features of the American economy with socialist economic organization. Although this sometimes establishes in the reader's mind an unreal dichotomy between American capitalism and other forms of economic organization, it imparts to the book a freshness of outlook that is most welcome.

Instructors may well find that in the classroom they have to use considerable economic analysis, both price and income, to explain the issues raised in the text. It is to be hoped that in any future revision Worcester will develop a systematic analytical foundation that is suitable for the beginning student. His objectives are excellent. He deplores the tendency of introductory courses to ape the graduate theory sequence. Economists would be grateful if Worcester would solve the continuing and apparently ineluctable problem of the principles course—how to present systematic economic analysis to the student without driving him in despair to the history department.

KARL DE SCHWEINITZ, JR.

Northwestern University

Economic History; National Economies; Economic Development

Economic Aspects of the Second Bank of the United States. By WALTER BUCKINGHAM SMITH. (Cambridge: Harvard University Press. 1953. Pp. 314. $5.00.)

Here is a good study, in which the author may take satisfaction; for which the Committee on Research in Economic History, to the extent of its aid, is to be thanked; and from which readers will get pleasure and profit. Since Catterall wrote fifty years ago, and Dewey more than forty, additional weathering has raised the grain, as it were, of the 'twenties and 'thirties of the last century. At least Professor Smith by his diligent and far-flung inquiries has restored the doings of the Second Bank, and what was done to it, in the whole of its life—from injudicious beginning to stern rescue, serviceable performance, political demolition, and brief, unhappy reincarnation under Pennsylvania auspices. Careful, competent scrutiny has done more than restore the texture of the times, for the fact is that only in the retrospect of more than a century do we discover the meaning of a scene which was confused to the impassioned participants.

We knew the politics of the Bank and of its assailants; we had much of the administrative modes and motives of the institution as contrasted with the ignorance and prejudice of its enemies in states and in national capital. The present author, in re-examining these, has set them against the background of American and international economic developments to give us three dimensions instead of two. Full particulars are furnished along with a talent for summary and a praiseworthy temerity in offering conclusions. It is extraordinary how many times this history supplies comment on subsequent economic and political happenings in our country. The early 'thirties of the last century were a "new era" much like the 'twenties of our own memory. Biddle and his brethren, to their critics, were conspirators under foreign domination, though not precisely in the fashion alleged against architects of New Deal and Fair Deal.

After the Revolution, putting aside the interval of the Confederation, national authority was indispensable. Its uses were questioned, to be sure, but for a decade and more the ends justified the means. Even the Jeffersonians practiced a hold-over Federalism which they could not preach. But by the period of the gentry with whom Smith deals, national power was invoked without discernment. Public virtue, to Jackson and his partisans, must take the form of public violence. Nor were their opponents in the Bank free of this disability. A beneficial blend of individual advantage with national interest was beyond the Democracy of that day. The Treasury was custodial, not creative. Biddle was economically adept, politically unskillful; Jackson was the reverse. The best to be expected was a counterpoise, not a cooperation, of forces. The country extended itself too far and too fast for self-discipline to keep pace. The economy broke down in 1837 and the Constitution was not long behind it.

This book is more than the story of the Second Bank of the United States. It lifts the curtain on the rehearsal for the Civil War. Not that the author

anticipates. The reader has to do that for himself, which makes the work, in its connotations, a valuable aid to understanding American history.

BROADUS MITCHELL

Rutgers University

Economic History of Modern Europe. By HEINRICH E. FRIEDLAENDER and JACOB OSER. (New York: Prentice-Hall. 1953. Pp. xxiv, 611. $6.00.)

Economic History of Modern Europe attempts to present the development of Europe's present-day economic system by surveying the progress made in selected countries. England receives by far the greatest amount of attention, followed by France and Germany. The authors have realized full well the impossibility of presenting a detailed study of the economic developments in all European countries in a volume designed to be used in a one-semester course. It is for that reason that they limit, for the most part, their study to the major western European countries.

The development of Russia receives far too little attention, at least to the mind of the reviewer. Although some major developments in Russia are considered, there is no detailed discussion of the development of this area of Europe. For example, the first five-year plan is no more than surveyed. The remaining Russian five-year plans are not considered, although they certainly portray the changing pattern of Russian development. The turning of Russia to the East and the industrialization of that area is not considered. True, the authors seek to emphasize the western areas, but they have not touched the changed direction and pattern of Russion growth which have caused many changes in the pattern of western development.

In tracing the development of the economy of Europe the study stresses the growth of the capitalistic system. The first section deals with the development of capitalism before 1870; the second, with "a period of mature capitalism that spanned the years 1870-1914" (p. viii); the years after 1914 have been divided according to the two World Wars with the divisions made because "We feel that 'before 1914' and 'after 1919' and 'before 1939' and 'after 1939' are major historical dividing lines like 'before and after the deluge'" (p. viii). The treatment of the several divisions is about equal in length except for the fourth division covering the period from 1939 to the present. This very important section is allocated only some 60 pages. Some advertising of this text has emphasized the case studies of the Marshall and Schuman Plans, yet these plans are only briefly covered with some four pages devoted to each. Again, much has been said about the inclusion of some 130 biographical vignettes on inventors, leaders of industry, and others who have influenced economic development in nations. Some of the sketches are noteworthy; but it is difficult to establish a justification for all, especially when there is so much important material that needs to be covered in a text dealing with European economic development.

Realizing the difficulty of presenting the economic as separate from the political, the authors have tried to interconnect the two by including a summary of the important political happenings in the beginning chapter for each

section. These summaries aid those with some background of political history but seem only to leave others with a very hazy picture of political activity during the period in question.

All major divisions of the economic development of nations are studied, with the emphasis upon agriculture, industry, commerce, transportation and communication, money and banking, and labor organization. These same topics are treated in each chronological division. The development is by countries with the major countries receiving the greatest attention. Where one or more of the smaller countries contributed or advanced a new concept, then that concept is developed. The smaller countries are not included in the main theme of the study but woven in to complete the picture.

Although the chronological periods are slightly different from those usually found in texts of this nature, the material is, of course, much the same. The authors have relied quite heavily upon secondary sources and have contributed little that is original to the study of the economic history of Europe. A bibliography is included at the end of each chapter.

For those desiring a survey text on European economic history with some background political material included, this text may be the answer. It seems best suited to the sophomore level with the instructor supplementing the text material.

JOHN W. CHISHOLM

Louisiana State University

The Origins and Development of the American Economy. By E. A. J. JOHNSON and H. E. KROOSS. (New York: Prentice Hall. 1953. Pp. x, 420. $3.75.)

This is an extension of Professor Johnson's *Some Origins of the Modern Economic World* (1936). Readers of the earlier work will find it reappearing largely unchanged as Part I of the present work (reviewed in September 1936 by N. S. B. Gras for this *Review*, XXVI, 511).

Major interest now is with Part II, *The Development of the American Economy*, which Professor Krooss has added. This part, roughly the final two-thirds of the book, tells of "the great, benevolent potential of the American economic system" and of how it happened that the American people "have a higher standard of living than that of any other nation." The publishers offer the book in its present form with the hope that it may prove useful as a supplementary text in introductory economics courses. Johnson's earlier work has already demonstrated its usefulness as a simple, clear exposition of the way in which the modern economic world came to be. His method is clearly historical. Kroos considers in greater detail the American phase of this broader development. His method is professedly historical, though the historian might prefer to call it statistical.

Certainly statistical data are present in great profusion—data on national income, per capita income, manufacturing profits from 1817 to 1826, the character of corporation investment in 1950, real wages and money wages 1929-1950, the changing composition of the labor force from 1890-1929, relative farm prices 1860-1950, etc. A complete list would be half as long as the book.

Instructors and some students will find this information useful. However, Krooss may have overestimated the beginning student's tolerance for statistics.

On the other hand, the data offered on some specific matters is sometimes so meager that it may leave the economist, the historian, and even an occasional student wondering just how conclusions in these matters are reached. In part this is due to the almost complete lack of documentation. In greater part it is due to an occasional lack of internal coherence. For instance, his generalization that real wages increased 70 per cent from 1929 to 1950 can hardly be derived from the accompanying figures on weekly and hourly money earnings even when the former, re-expressed in terms of a 1951 dollar, are seen to rise from $50 to $65 and the latter from $1.14 to $1.60 (p. 236). One wonders too what kind of dollars are involved in his $180 billion national income for 1950 and whether a per capita increase in income from $612 in the period 1919-1928 to $1,200 in 1950 is an accurate measure of "improvement in living standards" (p. 167). Possibly the most misleading use of statistics appears in his discussion of the difficulty in using machinery efficiently on the family-size farm. This, he hints strongly, has led to an enlargement of farm size until in 1945 some 2 per cent of farms included 40 per cent of all farm land (p. 267). He does not mention, and the student can hardly be expected to know, that 83.2 per cent of the land in these large farms was in pasture (*Agriculture Census*, 1945, II, p. 62) and hardly involved the use of any more machinery than a jeep, a fence, and a block of salt.

These deficiencies are perhaps inevitable in a book which attempts to measure so much in so little space. There is much here of value, particularly his data on financial institutions, the expansion of government influence, and the economics of America's wars.

LLOYD R. SORENSON

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Report on Financial and Physical Problems of Development in the Gold Coast. By DUDLEY SEERS and C. R. ROSS. (Accra, Gold Coast: Office of the Government Statistician. 1952. Pp. iii, 172 + 63. 5 *s.*)

This publication is the result of an investigation of building activity in the Gold Coast economy conducted by the authors in the summer of 1951. The report was prepared at the request of, and is addressed to, the Gold Coast government; and though bearing considerable interest for other readers, it should be read with this fact in mind.

The authors are anxious to stress the point that the building industry (which is of importance chiefly because of the predominant rôle it plays in the Gold Coast development plan) can only be adequately understood by first appreciating the place of the industry as one of many interdependent elements within that economy. They therefore begin with a discussion of the economy as a whole, proceed to the problems encountered by a development program, and only then occupy themselves with the characteristics and problems of the building industry itself.

There are two characteristics of the Gold Coast economy which are re-

garded as of particular significance. The first is the importance of a single export crop, cocoa; produced largely by relatively small native farmers, this one item provides from 30 to 40 per cent of the total output of the economy and about three-fourths of all exports. The second feature is the fact that the country finds itself in the almost unique position of having foreign exchange (pounds sterling) available to buy more goods than can be physically brought into the country; and this situation is likely to continue for several more years at least. The bottleneck is that existing port and transport facilities are not capable of handling increased supplies. In addition, some capital goods either cannot be purchased at all in the sterling market or can only be obtained after prolonged waiting periods due to the competing requirements of the Western defense program.

With these facts as a background, there are excellent discussions of the existing commercial organization, of the currency system, of agricultural activity and its responses to changes in price, of the organization of the building industry, of attitudes toward work in the nonagricultural sectors, and other items. The book provides a very informative picture of a backward economy and of the strains and bottlenecks encountered within it upon the initiation of a program of economic advance. The findings, it may be noted, are not always what one is led to expect by more abstract economic theorizing. For example, though labor is "cheap," "as a rough general rule mechanization justified in England is justified in the Gold Coast" (p. 103). This is so because though labor is cheap per day it is expensive per unit of output due to the actual social and economic environment within which it is employed.

Although the report is noteworthy for the realistic manner in which it deals with the Gold Coast economy, in other respects the results are less happy. The analysis is distressingly oversimplified at points; shortages pointed out in one section are on occasion forgotten in seeking solutions to problems subsequently discussed; and there is considerable repetition of a few central points. A particularly annoying example of this last is that, though the lack of sufficient port facilities is pointed out again and again, there is nowhere a discussion of the possibilities which may exist of alleviating this restraint.

In addition to the body of the report, five appendices are included. These are concerned with the construction and use of a set of national accounts for the Gold Coast economy, a study of building costs, and a discussion of various statistical data which should be collected.

CHARLES ROLLINS

Stanford University

Statistics and Econometrics

A Textbook of Econometrics. By LAWRENCE R. KLEIN. (Evanston and White Plains, N.Y.: Row, Peterson and Co. 1953. Pp. ix, 355. $4.50.)

There appears to have been a brisk unsatisfied demand for a textbook that could teach econometrics to, say, seniors and first-year graduate students. There is a well-known inverse Say's Law of publishing, according to which

demand creates its own supply. With a degree of confidence rare in other branches of economic forecasting one could predict that this situation would result in the appearance of several textbooks in this relatively new field. And so it has. To my mind this is easily the best of the lot. It is lucid, teachable (with the right instructor and the right class), covers a lot without trying to cover everything, and, as befits a text in econometrics, tries to pay attention to both the economic and the statistical sides of whatever it is talking about. I think it will corner the market, and deservedly.

The instructor in a course labeled Econometrics faces a major problem before he starts: what shall he assume the students already know? Of course, it doesn't really matter what he assumes; it will turn out in the end that they are completely innocent of mathematics, and have a statistical training which has stressed the deeper advantages and disadvantages of the harmonic mean; some of the students may even be there by mistake, under the impression that econometrics is a novel form of psychotherapy. Klein takes for granted that his students have been through the standard two-year calculus sequence. They are supposed to know about derivatives and integrals. On the other hand they are not supposed to know about probability, statistics, matrices and determinants. But all four of these notions come up again and again in the course of the book. Klein believes he has covered himself by including as Chapter 2, in some 40 pages, a brief summary of probability and statistical inference, and as an Appendix another 20 pages on the elementary properties of matrices and determinants. I fully sympathize with the intent of this device, but I frankly don't think it stands a chance of success. In the first place, his hasty attempt to skim here and dip there leads Klein into casual mistakes; he states on page 51 that the sample mean *always* consistently estimates the population mean, on page 57 that *all* tests of hypotheses are unbiased, and on page 61 that *all* zero-sum, two-person games are determined. But what is much more important, the plain fact is that probability, statistics, and linear algebra are deep and important fields of knowledge. The only way to learn and use their results is to study them seriously. It is idle to believe that anyone who has not done this can understand and appreciate the material in the rest of this book. Actually, only the statistics is really indispensable. The algebra can be circumvented except for the discussion of some computational techniques. But algebra is *useful*, not only here but also elsewhere in economics. A student motivated to learn econometrics ought to be willing to learn first a little mathematics and statistics.

The heart of the book is Chapter 3, which discusses the estimation of aggregative models completely and in detail. Most of the work is carried on in terms of a few particular models of the kind Klein has worked with elsewhere. Simple least squares is handled first. Then the identification problem is introduced and the maximum likelihood and limited information estimates for linear systems are explained. I know of no other place where the student can get such a clear idea of what equation-system methods are all about. In addition a few bits of extra sophistication get tossed in, such as Geary's method of instrumental variates, and the treatment of autocorrelated disturbances.

Taken together with Chapter 4 on computational design, which contains an extraordinarily meticulous treatment of the least squares (Doolittle), maximum likelihood, and limited information computations, this part of the book should equip the reader to perform, let alone understand, analyses of this type. As Klein points out, it is of first importance that students should actually perform econometric research, computations and all.

Chapter 5 is concerned with the treatment of models of the same type, only less aggregative. It is quite possible that in the present state of the art less ambitious studies of single industries or markets are more to the point than the more grandiose schemes. The treatment is again very useful, practical without being excessively mechanical, and illustrated by some of Klein's work on the railroads. The suggestions for "grafting" sector models onto aggregate models are novel and promising, a good thing for graduate students to learn.

Chapter 6 has some material on prediction, some of which is a little formal for the level on which it is pitched but otherwise a good lesson, and a section on input-output models which is much too brief to be useful. The last Chapter, 7, has three sections. One is on models which contain errors of measurement instead of the now more usual shock terms, one per equation. The discussion centers around weighted regression methods, which assume at least the ratios of the error variances to be known. Pedagogically I think this will be most useful as evidence to the student that figures never speak for themselves, and that without assumptions you get no conclusions. It would be well for the instructor to point out what Klein neglects, that with wrong assumptions you get wrong conclusions, and sometimes no warning. A second section is on weighted regressions from sample survey data. This is excellent, but much too brief. I would have liked to see it expanded into a chapter on the full treatment of sample survey data, beginning with some elementary facts about design. There is at least an even chance that here and not in time series are the more fertile fields. The final section takes up the treatment of monthly and quarterly data. I always look eagerly to see what an author has to say about seasonals. Klein comes out very well. He teaches the student only correct things, but unfortunately without bothering to explain why the "classical" methods are no good. The whole last third of the book does not quite maintain the expositional excellence of the rest; there is a noticeable lack of worked examples, for instance. But this is a minor quibble.

I feel a little more strongly about the selection of topics studied. A reader whose whole acquaintance with econometrics came from this text would think that there is nothing to the subject but various applications of linear regression and related techniques. For almost nothing else is covered. Now realistically, pride of place must certainly go to regression techniques. But for students whose outside acquaintance with statistics is meager, a more extensive and less parochial selection would have been fairer and more useful. I have already mentioned that I missed a general discussion of sample surveys. Lorenz curves are merely mentioned, and no other techniques for studying frequency distributions get even that much. The index has no entry under index numbers. This is a narrow view.

I used to think econometrics was the wave of the future; now I am not so sure. It is just possible that the fault lies not in ourselves but in our stars. In any case, where is current research effort best directed? Probably at this stage improvement of the quality of the data, and the development of richer and more realistic economic hypotheses will have higher yields than the further refinement of already top-heavy statistical methods. Even so, high precision is hardly to be expected in this business. But graduate students should be taught what econometric analysis can do; and this is the book they will learn from.

ROBERT M. SOLOW

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Introduction to the Theory of Games. By J. C. C. MCKINSEY. A Rand Corporation Research Study. (New York: McGraw-Hill. 1952. Pp. x, 371. $6.50.)

This is the first text on the theory of games to appear since the publication of von Neumann and Morgenstern, *Theory of Games and Economic Behavior.* Proofs of the fundamental theorems have been simplified considerably since the latter book appeared, and, in addition, many new results have been obtained. McKinsey has incorporated these developments in his book, and has included a much higher proportion of new results than is usual for textbooks. Whenever there was a choice among methods of proof, McKinsey has chosen the more elementary methods. He seems to have done this without sacrifice of content.

For those with limited mathematical equipment who are interested in acquiring a detailed knowledge of the theory of games, this is an excellent presentation. It demands of the reader a knowledge of calculus (including the notions of convergence, continuity, derivative, integral, minima and maxima), some smattering of matrix algebra and a willingness to follow the arguments closely. The book is written with unusual care and precision, resulting in a clarity of expression for which the reader, particularly the mathematically weak one, will be grateful.

The first six chapters present the theory of zero-sum two-person games where each player has a finite number of strategies. These games are studied in both normal and extensive forms. Chapters 7 through 10 consider zero-sum two-person games where each player has infinitely many strategies. Some mathematics essential for this theory is presented here. These chapters could be omitted without loss by anyone not particularly interested in this special class of games, since all the basic ideas are developed in the chapters dealing with games involving a finite number of strategies.

The chapters on n-person games will be of particular interest to economists. McKinsey presents the von Neumann-Morgenstern theory of n-person games in a very clear way and is careful to point out its shortcomings. He also presents the Nash theory (essentially a generalization to n-person games of the notion of equilibrium originally defined by Cournot for the duopoly

problem), and discusses approaches along other lines. Those interested in following the courses of contemporary mathematical economics will find this material invaluable.

McKinsey makes some attempt (two chapters) to present the formal connections between the theory of games and linear programming, and the theory of games and statistical decision theory. These chapters will be more useful to readers already familiar with the fields.

The clarity of thought, the precision of exposition, and the completeness of coverage of this book make it an excellent introduction to the theory of games.

STANLEY REITER

Stanford University

Business Fluctuations; Prices

Economic Change: Selected Essays in Business Cycles, National Income, and Economic Growth. By SIMON KUZNETS. (New York: W. W. Norton. 1953. Pp. viii, 333. $4.50.)

This is a collection of essays by the distinguished nominee for president of the American Economic Association in 1954. Nine of the eleven essays in this volume have been published previously (two in Spanish), but many are inaccessible to the average reader. They range in scope from almost purely theoretical to eminently empirical (although more technical and more methodological candidates for inclusion were rejected). The coverage indicated by the subtitle represents, "albeit roughly," the sequence of the author's interests.

The volume begins with two essays, dated 1930, attacking the equilibrium concept dominating the English-American tradition in economic theory in the first quarter of the present century. These throw a great deal of light upon the author's development as an economist, largely explaining his subsequent restless concern with dynamic phenomena and with inductive investigation. This provided their greatest interest to the present reviewer, for, read today, they seemed a little commonplace and awkward: much of their constructive content is today more effectively and adequately expressed in other ways. This very fact is, of course, a tribute to those, including Kuznets, who pioneered in the revolution in economics of the two decades which followed.

The third essay, also in some respects obsolete, stands the test of time much better. It is the well-known exposition and criticism of the acceleration principle: "The Relation Between Capital Goods and Finished Products in the Business Cycle" (1934). Although "interaction with the multiplier" is hinted at in a footnote, the essay otherwise considers the acceleration principle standing by itself. Nevertheless, it still deserves study and reflection. Apart from the care and completeness with which the several versions of the acceleration principle are expounded, the essay's criticisms of the principle, and its statistical tests, are very relevant for those seeking to place the accelerator at the

center of their explanation of the cycle. Hicks[1] might well have studied it with care.

What is badly needed today is a comprehensive re-evaluation of the acceleration principle, written with a scope and care comparable to Kuznets'. Until that is done, Kuznets' essay remains essential.

Following a sympathetic yet critical review of Schumpeter's *Business Cycles*, treatment of cycles concludes with a hitherto unpublished essay on "Economic Trends and Business Cycles" (1947), an essentially speculative discussion inspired by Wesley Mitchell's characterization of business cycles as the product of a business enterprise economy. In it Kuznets reveals his identification with the Mitchell concept of the cycle as a congeries of related movements in separable activities—a "unity in diversity." He also reflects the essential reluctance of this school to consider macro-economic relationships. Nevertheless, the essay sparkles with hypotheses for the interpretation of economic history—both trends and cycles.

The sixth essay considers problems of national income comparisons between "industrial" and "pre-industrial" nations. It is an example of Professor Kuznets at his best, full of profound and illuminating appreciation of the nature of economic activity and the problems of its measurement. At once imaginative and practical, it exemplifies the pragmatic ingenuity which pioneered the "invention" of national income accounting, an invention which one writer has characterized as more significant (to victory in the recent war) than that of atomic energy.[2] The major conclusion of the essay, incidentally, is that international comparisons of the sort made by Colin Clark grossly overstate the differences between the per capita national incomes of such countries as the United States and China.

In the course of reaching this conclusion, the author raises very serious doubts in his reader's mind as to the meaning of national income *as a measure of economic welfare*. These doubts are further expanded in the closely related essay which follows, "National Income and Economic Welfare." But, with characteristic optimism, Kuznets concludes only that the current development of national income and product measures needs to be expanded in new dimensions and directions. Unfortunately, most of these new dimensions are ones in which sociological and psychological considerations, and even value judgments, increasingly enter.

The preoccupation with social and cultural factors becomes even more marked in the next and most recent essay, "International Differences in Income Levels (Reflections on Their Causes)" (1950). Here Kuznets considers and successively rejects, as the primary explanation of these differences, population growth, industrial structure, literacy, investment per worker, climate

[1] J. R. Hicks, *A Contribution to the Theory of the Trade Cycle* (Oxford, 1950). To be sure, Hicks' treatment recognizes, and embodies, many of the limitations suggested by Kuznets, including one very significant one which Kuznets fails to consider—the lag between investment decisions and the production of capital goods. The latter, of course, becomes particularly relevant only when the multiplier is thrown into the pot with the accelerator.

[2] J. K. Galbraith, *American Capitalism, The Concept of Countervailing Power* (Boston, 1952), pp. 79-80.

and natural resources, racial characteristics, and national size. Instead, these differences can only be understood in terms of processes of historical development, a development which has required in the industrial countries—and will require in the yet undeveloped countries—a revolution in individual and social attitudes, cultural values, and structures of power.

The further study of economic growth will require intensive development and exploitation of quantitative data. "But the inquiry cannot, and should not, be limited to quantitative data alone. . . . The historical heritage of the several countries as embodied in patterns and values dominating social behavior, their political structure, their attempts, successful and otherwise, to adapt the elements of the industrial system to conditions within their boundaries, would have to be examined. . . . A proper analysis of data of this kind, in conjunction with quantitative data, would impose upon the scholar problems for which the tools of his particular discipline—whether it be economics, political science, sociology, anthropology, statistics—may not be adequate."

The development and broadening of Kuznets' thought over twenty years is at once apparent when we turn to the essay which follows: "Retardation of industrial Growth" (1929). Here Kuznets is considering, in part, the very problem discussed in the previous essay. But social, political, cultural factors barely intrude. Growth is measured statistically. Its explanation lies primarily in technological factors and in "economic conditions in their technical aspect."

The volume closes with two more recent essays. One, written on the eve of war in 1941, speculates as to postwar trends in economic growth. The other, written since the war, reviews in lucid fashion the past trends in U. S. international economic relations, and their possible future directions. From the former we pick up two sentences with which to characterize the author of these essays. "There is no one as revolutionary as a scientist within the narrow field of his specialty, and no one potentially as conservative in the broader field that provides the basic postulates for his specialty." From the earliest to the latest of these essays, the constant challenge which Kuznets has posed to complacent acceptance of established postulates not only in his own field but in all to which it is related displays the exception which proves his rule.

His own work has increasingly exemplified the need of which he speaks: "In the social sciences we have need of a new group of workers who combine the mastery of detailed careful procedures essential to the research scientist with the wider horizon of the historian and social philosopher, and we have need on the part of our specialist groups of greater awareness of the variety of historical experience and mutability of the social framework within which lie the more narrowly defined phenomena that they study."

GARDNER ACKLEY

University of Michigan

Economics in the Public Service. The Intimate Story of the First Six Years of the Employment Act. By E. G. NOURSE. (New York: Harcourt, Brace & Co. 1953. Pp. xi, 511. $6.00.)

This volume is an account of a noble, controversial and surprisingly difficult experiment in the organizing of government for integrated economic

functioning; as seen by one who was a principal participant during the first half of the period covered, and an interested observer during the second half, after his resignation as chairman of the President's Council of Economic Advisers. In Nourse's account, substantive matters of economic policy take second place to the administrative questions involved.

His account falls into three parts. Part I (six chapters) sets forth his philosophy of economic advisership, precedents for such advisership and the developments culminating in the Employment Act—this last feature being completed by Chapter 17, on the intent of Congress in passing the Act. Part II (ten chapters) is a factual narrative of the application of the Act, as objective as the author can make it (but his critical judgments refuse to be wholly concealed). Part III (five chapters) presents his reflections and appraisals, first retracing parts of the narrative in a less objective mood. The book is a mine of information as to the detailed working of this experiment, and an impressive object-lesson in the complications involved, especially in the attempt to utilize professional economic analysis and advice.

First as to the intent behind the Act. There were disagreements over the defining of the objective, and the specifying of compensatory spending as a means. These were resolved by substituting more general for more specific mandates; hence the omissions are peculiarly instructive. The phrase "full employment" was rejected and the word "opportunity" inserted, together with expressions intended to exclude employment of the "leaf-raking" type. Rejected was the explicit concentration on compensatory spending. In practice, so far, fiscal policy has bulked large, but as a means of limiting inflationary pressure rather than remedying insufficient employment, with the result that it appears in a conservative, rather than a radical, rôle.

Eliminated in Conference was a requirement that the Council make available to the Joint Committee all the "studies, reports and recommendations" which it has submitted to the President. This requirement would have made confidential advice by Council to President impossible; but its elimination left the question open, so long as the Council might be called to testify before the Joint Committee.

Omitted also was the proposal that the members of the Council represent different groups in the economy. But the principle, for which Nourse has contended, of bringing "scientific" economics into the picture at the Council level, and of permitting its members to retain an independent and objective professional character, was not actually written into the Act, and was not the intent of all its supporters. The placing of professional economists on the Council stemmed from the inherent logic of its task, not from the clear intent of Congress. This issue of professional objectivity was, of course, the main point on which Nourse split with his two colleagues on the Council, and his attitude begins to show in his opening chapters. He distinguishes economic science and economic engineering. The former, though inexact, may detect and measure departures of actual conditions from an optimum; but devising remedies is a task of engineering or practical policy. Nourse extends the

concept of engineering to the *economic aspect* of the work of the politician, recognizing that he is in addition a leader or salesman, demagogue or statesman or a little of both, and mediator between what is good economic engineering and what will be accepted by the citizens. Nourse says: "Broadly speaking, I think we should have economic scientists in the Council posts and in the staffs of both Council and (joint) committee, economic engineers (of varying degrees of professional competence) in the person of the President and members of the Joint Committee, the real formulators of national policy." To the reviewer, this does not seem fully to fit the fact that the Council, in addition to scientific analyses, is called on to give policy advice, on the level of economic engineering, to politicians who may legitimately overrule or modify it in the light of other considerations pertinent to their more inclusive task. The resulting dilemma seems to have been the real trouble-breeder, ramifying out into a complex of other questions.

Nourse's answer is uncompromising, centering in the statement (p. 417) "The moment a man accepts the President's invitation to become an Economic Adviser (or White House aide), he must either take on a confidential status or become a liability to his chief." This calls for truly great self-abnegation. An economist of high standing must forgo the published work which is the means to further recognition, without receiving in return any assurance that he will have contributed directly to policy decisions, asking merely that his advice shall have been considered before policy decisions are made (Truman, Nourse felt, did not give it such consideration). Even his service of public education would be placed under added limitations which might be rather severe. For such a man, this sounds likely to mean martyrdom, anonymous.

Nourse proposes that the Council issue no separate report of its own, merely appendices to the President's report (for which it will still, presumably, have furnished raw material, coordinated in the light of prior liaison with interested departments and agencies). The Council could also hold conferences with groups outside government, and its members could even give public addresses on safe subjects. Nourse attempts no answer to the question who should sponsor, in Congress, on behalf of the President, a program more comprehensive in scope than any executive department, and presented to an equally comprehensive Joint Congressional Committee. And, to the reviewer, this almost anonymous status appears incompatible with the original idea of Cabinet status and prestige for the Council. Its effectiveness appears to depend on finding out how much economic analysis the President will have time and capacity to assimilate, and giving it to him in corresponding doses (necessarily summaries) while at the same time briefing with more extended analysis the personal advisers (if identifiable) to whom the President will turn for guidance in deciding what weight to give the Council's economic engineering as against broader political considerations.

The antithesis of this anonymous advisership would be the concept of a political ministry without portfolio, charged with developing coordinated policy, which should be economically sound and should fulfill the mandate of the

Act, always subject to the President's approval. They would presumably support, before Congress, a presidential program with which they did not agree 100 per cent, but serious disagreement would call for their resignations. On either basis, Nourse makes it clear that numerous practical problems remain. It is perhaps not surprising that these were not fully foreseen in the setting up of this novel governmental mechanism. But it is taking time to work them out, and in the meantime they can threaten the success of the experiment. They will be points to watch in the fresh start which the new administration has undertaken to make.

Turning from the Council to the Joint Committee, it is not faced with the self-effacement of a confidential adviser, but its members must limit their direct legislative activities, to spend time on an advisory function which has not fully proved its importance (though Nourse cites cases in which he thinks it has been effective). Able and outstanding members have spent a notable amount of time on the Committee's work, and have advanced somewhat beyond the stage of dividing on straight party lines. But problems remain.

In Nourse's final appraisal, the conclusion is that all four main features of the Act—the declaration of national policy, the President's Economic Report, the Council and the Joint Committee—represent steps in the evolution of our governmental structure and function, which will not simply be reversed. Of the four, perhaps the President's Council is on the most insecure basis, for reasons already indicated. Relative to the basic purposes of the Act, the Council's economic philosophy has never been clearly formulated (*cf.* pp. 423-24). The Council has impliedly asked the readers of its reports (of which Nourse gives samples) to have faith that behind its diagnoses lies more definite knowledge than it has chosen to disclose as to what market adjustments are good or bad, and whether good market adjustments are in themselves sufficient to the purposes of the Act. And in the commendation or exhortation addressed to private interests, there is a similar implied faith that these interests know enough to choose socially good and sufficient policies. The reviewer cannot avoid having some faith of the sorts indicated—for instance, that Nourse had definite ideas about the effects of the "Brannan Plan," to which he could not get Truman to listen. But on broader macroeconomic questions, not all doubts are put to rest.

The organization of this book does not make it easy for the reader to distill from it the story Nourse is telling. Part II is divided into subperiods, each treated from the standpoint of the Council, and again from that of the Joint Committee, while Part III retraces part of the story. The result is an effect of repeated flashbacks, confusing the chronology for readers who do not have it so firmly fixed in mind as Nourse himself does. The treatment of particular problems is split into separate pieces, and some bits seem to be lost—for one conspicuous example, the enactment of post-Korea anti-inflation controls, which seem to have bypassed the whole mechanism Nourse is discussing. Is this mechanism so ponderous and time-consuming that any need for prompt action must be met by bypassing it? This is one final question with which the reviewer is left.

In conclusion, Nourse has made an enlightening contribution to American political-economic history. It is to be construed in the light of his known views. He is sure that, on the key points, he was right and those who disagreed with him were wrong. And he has furnished evidence which persons who wish to understand this important experiment cannot afford to ignore.

J. M. CLARK

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La fin de l'inflation. By JEAN GABILLARD. (Paris: Sedes [Société d'Édition d'Enseignement Supérieur]. 1952. Pp. xxxvi, 359.)

Why and how do inflations end? This is a neglected aspect of economic study. Most theoretical treatments of open inflation view it as a cumulative process, proceeding indefinitely until brought under control by forces outside the private economy—credit restriction, currency reform, price and wage control, etc. M. Gabillard's dissertation breaks with this convention. Impressively erudite, and drawing freely on both theoretical and descriptive literature in three languages, Gabillard treats inflations as special cases of cyclical boom, generating stability or deflation in much the same way as cyclical booms are believed to generate crises or depressions. In support of this thesis, he limits himself to places and times for which reliable figures are available. His examples, four in number, are the United States in 1920, Germany in 1923, France in 1926, and once again the United States in 1948, but there are frequent references to parallel episodes in the smaller nations of Western and Central Europe. These four cases of course vary widely among themselves—in severity, in interconnection with balance-of-payments problems, in methods of eventual control, and in degree of subsequent deflation; Gabillard is to be commended for restraint in not forcing them into a single mold. Furthermore, since attention is focussed on individual jumps in price levels, this volume yields no light on the more important problem of *secular* inflation, in which successive jumps succeed each other with rapidity sufficient to produce a long-term upward trend.

The heart of Gabillard's thesis is Part III. Among the factors cumulating to reverse the four postwar inflations, he lists the restoration of transport, the recovery of domestic production and export capacity, the filling of "backlogs" of consumer demand and capital investment, the decline of world agricultural and raw material prices from postwar peaks, and the drawing of capital assets from current production and employment to speculation in produced goods, in gold, and in foreign exchange. Much of this is well known, but two points of novelty appealed to this reviewer. One is a theory that abnormal inelasticity of demand tends to shift from foodstuffs to durable goods and then again to speculative inventories as inflation progresses, and that the last-named shift may be used to signal the end of the inflation. The other is a theory relating the duration of inflation to the time period required for mass per capita consumption to return to its real preinflation level. As regards the *political* economy of inflation's end, Gabillard maintains that effective anti-inflationary monetary or fiscal legislation is permitted by the capitalist class only under

conservative governments, which will safeguard their war and inflation profits against effective income taxes and capital levies. Schacht in Germany and Poincaré in France emerge from this treatment as hired technicians of a class, rather than public-spirited architects of financial recovery.

Also included, although as a side issue (p. 204 f.), is an excellent brief discussion of "escalation" and its effects. Since it also illustrates certain of Gabillard's methodological positions, I venture a running quotation in home spun translation:

> The location of an inflationary process has great importance for the form of inflationary development. The problems posed by the adoption of wage and salary escalation (*l'échelle mobile des salaires*) make discussion of this sort more realistic. It is as false to say that escalation has *always* an inflationary effect as to say it has *always* a deflationary one. It all depends on the location of the dominant inflationary pressures. If these are localized in the markets for foodstuffs, escalation runs the risk of further reducing the price elasticity of the demand for food; it will then have an inflationary effect on the markets for these products, and elsewhere by transmission and propagation. But if, as in present-day France, inflation is above all due to a rise of profits, which are used for speculation in gold, inventories, and foreign exchange, while supplies of consumption goods are adequate, wage increases may reduce inflationary pressure by shifting income and demand from inflationary sectors (speculation) to neutral ones (consumption goods). . . . Of course, completely generalized escalation, if conceivable, would be the surest means of creating a condition of permanent inflation. But we must stress again that it would have to relate to *all* price phenomena, including rents and public finances, and that it would have to render all payments periods homogenous, so that none could benefit from any time lags. But whenever escalation is partial, it tends to be inflationary in so far as it benefits the economic class or group which dominates the inflation, and deflationary in the contrary case.

The first section of Gabillard's book is methodological, the second historical. Neither is as closely integrated with the third, or analytical, section as it might have been. Indeed, the two parts combine to furnish a scholarly pseudosubstructure for the largely unrelated conclusions which follow. Nevertheless, they are interesting in themselves. Gabillard objects (with good reason) to both the monetary and the income theories of inflation as overaggregated, and overlooking important features of the inflationary process. He favors an approach through stages in time and through sectoral price movements, and develops a tabular and graphical structure which he applies to the four inflations under consideration. The structure and its methodology might serve as a French translation of the Burns-Mitchell-National Bureau structure of business cycle analysis, applied to the allied problem of inflation, and subject to similar criticisms. They produce imposing edifices which may lead to conclusions incommensurate in importance with the apparatus itself, or (as here) largely unrelated to the technical impedimenta.

M. BRONFENBRENNER

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Business Finance; Investments and Security Markets; Insurance

Investments. By JULIUS GRODINSKY. (New York: Ronald Press. 1953. Pp. xii, 567. $6.00.)

This volume differs from most of the recent textbooks on investment in the strength of its emphasis on the theme "that the dynamic and expansive growth of the national economy is the primary source of investment value" and "that an expanding company, in an expanding industry, in an expanding economy is the touchstone of investment success." While other authors as well as experienced investors generally recognize the underlying logic of this point of view, and in fact espouse it to varying degrees, it is fair to say they in general seem to have more reservations than Professor Grodinsky as to its successful practical application to the average investor's problems. Moreover, many of them would probably be unwilling to make, with Professor Grodinsky, the flat assumption of a continuously expanding economy subject only to temporary cyclical interruptions. The possibility of a stagnant or declining economy, with attendant social and political changes, may not appear to exist for the visible future, but a conservative investment program must at least give it some consideration. In addition, analysis should be devoted to the investment implications of the renewed monetary inflation which present fiscal theories call for should adverse economic trends develop.

The content of the book is broad. Part I discusses briefly principles and objectives and the source of economic values. Part II devotes 45 pages to "Appraisal of the Industry." This is excellent material, well presented, on the growth and decline of industries and the consequences for investors. Part III, "Appraisal of the Company" is the largest segment of the book, 196 pages. It is a well-rounded discussion of the usual factors such as competitive position, financial structure, ratios, profit margin, public regulation, and management. Special emphasis is placed on management. An interesting chapter is included on the quality of corporate income. Part IV discusses public obligations. Part V devotes 155 pages to "Money and Markets," including a good discussion of yields and price-earnings ratios. A surprising feature of this section for a text stressing the fundamental importance of long-range growth is an unusually extensive consideration of market analysis and the various analytical and forecasting services. Even the venerable Dow theory is given six pages. One chapter in this section discusses portfolio management, with much space devoted to dollar averaging and formula plans. Part VI presents two chapters on institutional investments. Each chapter is followed by questions and problems, with lists of readings.

Grodinsky's book is descriptive rather than analytical, with a wide range of comment and numerous illustrations drawn from recent experience. The material is presented in an interesting manner, although some of it seems poorly integrated. Some confusion attends shifts in the point of view, as in the chapter on U.S. government securities, which is mainly a review of recent debt management policies and is written from the point of view of the Treasury rather than the investor. Why a rather complicated two-page table analyzing

investment policies and capital ratios of country banks should be put in the middle of Chapter 1 is not clear. Neither is the reason evident for inserting a chapter on preferred stocks between one on financial structure and one on financial ratios.

Despite his primary interest in common stock investment in growth companies, the author has made a strong effort to present fairly all sides of the more controversial points of policy, and in general is successful. Some slips are inevitable. One occurs in several questionable generalizations about bank portfolio policy which give the impression that investment in long-term U.S. government bonds is generally accepted as proper for commercial banks. A minor correction in the same area is that the Treasury's recently introduced tax anticipation bills were not bought initially by the commercial banks "due to the attractive yield" but because the Treasury offered the banks a bonus through permitting them to pay for the bills with credits on their own books.

To this reviewer's taste, two weaknesses of the book as a general text appear to be an unduly brief treatment of investment programs and policies and an unduly extended consideration of stock market analysis. The former would seem to leave too much of a gap between the principles laid down and their practical application, while the latter may too firmly implant some potentially hazardous ideas. Nevertheless, the book is well written, is strong in certain important respects, and merits a place on the investor's shelf.

DOUGLAS R. FULLER

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Public Finance

The Trend of Government Activity in the United States since 1900. By SOLOMON FABRICANT, assisted by ROBERT E. LIPSEY. (New York: National Bureau of Economic Research. 1953. Pp. xix, 267. $4.00.)

Here are the facts; interpret them as you will. With admirable objectivity and detachment, this book presents the fully documented evidence of the growth of government activity during the first half of this century. There are 28 tables and 16 charts in the main body of the book along with 39 tables in the appendices. The accompanying text, largely descriptive of the data therein presented, is appropriately limited. Although isolated individual series are of necessity based on somewhat flimsy original source data, there should be no quibbling concerning the general validity of the results. The possible margins of error are eclipsed by the sheer weight of the evidence. It may be predicted that this book rapidly will become one of the most widely cited sources for more interpretative, and less objective, discussions of the problem of governmental growth.

In spite of the rather widespread recognition of this growth, it will prove shocking to some, and revealing to all, to discover, among other things, that one out of every eight employed persons works for government compared with one out of twenty-four in 1900, that one-fifth of the nation's capital assets

are government-owned whereas only one fifteenth were so owned in 1902, and that the physical volume of goods and services purchased by government increased by more than a thousand per cent over the half-century. The author concentrates on the growth in real inputs used by government. This enables a more accurate comparison to be made between government and nongovernment activity. The growth in government expenditures, the series more frequently employed, is shown to overstate the real growth in the government's use of economic resources. The proper note of caution is not excluded, however; for many purposes the growth in real inputs, or even the growth in expenditures, tends to understate the increasing impact of government on the nation's economy.

Several of the more popularly held views concerning the growth of government activity are refuted effectively. The trend toward bigger government did not suddenly begin in the 1930's; it was well established from the beginning of the century. The car was already rolling downhill; the New Deal merely started the motor. Governments do not do many things now that they did not do in 1900; they simply do a great deal more of everything. The increase in government activity has not been exclusively at the central government level. Although the relative growth of the central government has tended to overshadow that of the subordinate units, the latter have grown substantially in absolute terms over the period.

There are some interesting speculations on the possible changes in the productivity of government. Has the increasing degree of specialization which has been made possible by larger scale operation more than offset the diseconomies of bigness and the declining hours of work? This question is tentatively answered in the affirmative, although it appears that a sharper distinction between the central and subordinate units could have been introduced.

Perhaps the most interesting chapter contains a discussion of interstate differences in state and local activity. Having forty-eight units to work with, a great deal more is done statistically with the state and local employment and expenditure data than with federal data. Interstate differences in per capita expenditure are correlated with income, urbanization, and population density, and these three factors are found to explain 70 per cent of the variance. Income is shown to exert by far the most important influence. This is, of course, what might have been expected, but the supporting evidence is useful. Income, urbanization, and density elasticities are computed for the various state and local functions. It is unfortunate that the most recent state-local financial data available in the compilation of these results were for the year 1942.

The questions which emerge from all this but which are not, indeed could not be, decisively answered are the following: Is the growth in government largely to be explained as a concomitant of the general development of the economy? Or does government follow inevitably the Wagnerian law of ever-increasing relative importance? Or does historical accident represented by the two wars account for the phenomenon? Or must the growth finally be explained by a fundamental shifting of values, by the swing of the social pendulum away

from the individualism of the nineteenth century to the new statism of the twentieth? There is much to support the economic development hypothesis which is tentatively advanced in this book. One bit of evidence is presented, however, which seems to support strongly Adolph Wagner's hypothesis. This is the rather startling fact that the performance of every major function at every level of government has increased. The mere listing of the few minor functions which have declined indicates their scarcity as well as their unimportance: booths for foot patrolmen, regulation of midwives, bounties on coyotes. Does not this suggest that there may be some sort of built-in irreversibility of public activity under representative government? If increasing government activity were largely due to economic development, would not declining sectors of the public economy have appeared?

All of the explanations for government growth are, of course, partly correct, and no one is adequate in itself. The relative importance attached to each will determine each individual's projections of the trend over the next half-century. The author of this book wisely refrains from making any specific projections of this sort.

J. M. BUCHANAN

Florida State University

The Federal Debt: Structure and Impact. By CHARLES CORTEZ ABBOTT. With policy recommendations by the Committee on the Federal Debt. (New York: Twentieth Century Fund. 1953. Pp. xvii, 278. $4.00.)

Professor Abbott has prepared a timely study on the federal debt—timely because the new administration has created the expectancy that something new and better in the art of debt management will be forthcoming. Abbott's study is designed more as background material than as a blueprint for debt management; the policy recommendations are supplied by a Twentieth Century Fund Committee.[1] This division of labor is not a notable success.

The main study is divided into two parts called the "Development of the Problem," and the "Analysis of the Problem." Abbott stresses the importance of the problem but neglects to explain clearly to his readers what the problem is conceived to be. In his last chapter, he gives some hints by asking the question, "Is a politically controlled money market compatible with the free market process?" (p. 188). Read in the context, Abbott's question seems to concern whether monetary controls can do their work in a setting of a large national debt. Events have already partly answered this question. A study of England's experience after World War I might also have helped. The United States is not the first country to emerge from a war with a large national debt. In any case, Abbott offers no solution; he is content to hand over the "problem" to politicians. But I have no confidence that I interpret Abbott's remarks correctly.

Part I of the study is a review of postwar experience with the federal debt

[1] The Committee consists of the following: Arthur R. Upgren, chairman, Henry H. Heiman, Neil H. Jacoby, E. B. MacNaughton, Earl B. Schwulst, Louis Stulberg, and Donald B. Woodward.

including backward glances to prewar and wartime developments. The change in the ownership of the debt, the pattern of rates, and characteristics such as maturity of various types of debt instruments are discussed on broad lines. Close attention is given to the Federal Reserve-Treasury differences after Korea with appropriate quotations from the participants. Abbott keeps his own views in the background, letting the events, where possible, speak for themselves.

Part II is a more detailed discussion of matters considered earlier. The data on the ownership of the debt are carefully presented in some detail by the classes given in the Treasury Survey of Ownership. The minimum holdings of each group are noted, and these are viewed as evidence of the firm demand for government debt by each class. Holdings in excess of these minimums are viewed as sensitive to the varying economic circumstances of debt holders.

His discussion of the effects of debt sales and retirements has the merit of being definite. Treasury repayment of Federal Reserve Bank holdings is regarded as deflationary, repayment of commercial bank holdings as deflationary or neutral, repayment of nonbank holdings as presumably neutral. Treasury sales of debt have opposite effects. In adopting this position, Abbott has illustrious company; nevertheless, the analysis seems incorrect. A repayment by the Treasury of debt held by the Reserve Banks is not deflationary; such a transaction is irrelevant to private expenditures. The Treasury has a smaller balance and the Reserve Banks have smaller assets. Treasury repayment of debt held by commercial banks is either inflationary or neutral—not deflationary. Bank excess reserves rise; hence lending power rises. Treasury repayment of debt with federal funds has exactly the same monetary effects as Federal Reserve purchases of government securities. Obviously what Abbott and others must have in mind are the joint effects of both cash surplus and an equal debt retirement or a deficit and an equal debt increase. It is of course perfectly proper to consider these effects together, but there is little justification for attributing the effects of both fiscal and debt operations to debt operations alone. Although the type of error which this procedure invites has been pointed out by Henry Simons, Abba Lerner, Charles O. Hardy, and many others, there appears to be some mental block in our officialdom as well as among financial students, including Abbott, which prevents them from recognizing the elementary fact that debt retirement is an inflationary, not a deflationary, action. Understanding of these points might raise more doubt about the view, endorsed by the Fund's Committee, that debt repayment should concentrate on bank-held debt. The theory that there is something inherently unsound in large holdings of government securities by commercial banks has yet to be demonstrated.

The final chapter consists of the Committee's analysis and recommendations. The Committee recommends budgeting for a surplus (without however advocating higher rates of tax), restoring monetary policy, lengthening debt maturities, coordinating federal lending programs, and transferring the debt from banks to other holders. Yet they acquiesce in an increase in the debt held by banks as the country grows. If inconsistencies are overlooked, many of the

recommendations seem reasonable enough; but they suffer from the lack of a clear statement of what debt management should attempt to accomplish. The Committee seems unduly complacent about the interest expense incident to higher yields; this matter is dismissed by stating that interest is "only 9 per cent of federal expenditures." But, it seems to me, the Treasury should be concerned with economizing on its interest expense. Like other actions of government, the results to be achieved need to be weighed against the costs. These results in case of debt management consist of holding down private expenditures—inducing people to hold debt instead of real things. The debt structure should be manipulated to *maximize the deflationary effect of the debt per dollar of interest payment*. Short-term debt may be too expensive a form of debt on this test even though the yield is lower than on long-term debt. One dollar of long-term bonds may do more "deflationary work" than five dollars of Treasury Bills.

We cannot let the Committee's method of estimating the federal debt go unchallenged. The size of the federal debt is computed to be approximately $505 billion (for June 1951). To obtain this formidable total, the Committee includes unexpended appropriations, Federal Reserve notes, loan guarantees, all government insurance in force, and other unusual items. The concept of debt employed is a peculiar one. The $155 billion included to cover the various insurance programs, for example, is based upon total insurance in force. On the same principle of computing liabilities, all private insurance companies are bankrupt. The present amount of the liability of the government under its life insurance programs is the amount of insurance in force only upon the assumption that all policy holders will die tomorrow. I can find no justification for including Federal Reserve notes in the debt total especially since it is recommended that this "debt" not be retired. Such misinformation about the size of the federal debt may do little harm, but it cannot be said to assist the public in forming sensible opinions about debt management and monetary policy.

The relation between a Committee and an author is a delicate matter. If the arrangement is to be a success, the author should provide some substantial ideas for his Committee to consider and the Committee should not lightly dismiss the author's findings. In the present case, the initial requirement for success is missing.

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Taxation and Incentive. By LADY RHYS-WILLIAMS. (New York: Oxford University Press. 1953. Pp. 188. $3.00.)

The first part of this book consists of an interpretation of British historical and institutional developments over the centuries as they have influenced the basic motivations and incentives affecting the British people. The second part consists of a detailed proposal for a revision of the British tax structure and

social insurance program designed to provide increased incentives to work and savings by a diminished emphasis on progressive taxation. The first of these two parts covers about two-thirds of the volume and is of much greater general interest to non-British readers; it will, therefore, be stressed in this review.

According to the author, the book "represents a plea for the study of the whole question of taxation and incentive and of the underlying problem of how to maintain justice to the individual at the same time as justice to the community . . ." (p. 8). This problem, in the author's judgment, is of vital importance to the British economy because of the degree to which the traditional incentives for hard work and continued saving by private individuals have been weakened or destroyed. This thesis is supported, in the first instance, by a detailed discussion of the motivations for effort affecting the British economy.

The author classifies incentives into those based on fear and those based on hope of gain. In the former category she distinguishes the fear of punishment, the fear of want (or poverty), and the fear of loss. For the mass of the working population she regards the fear of poverty as the chief incentive to labor, even in the modern welfare state. She points out, however, that "the principal aim of the present century has been to put an end to want" (p. 14), thereby weakening this incentive.

The author regards the fear of the loss of position and privileges as the real incentive affecting the more fortunate classes, those not in immediate danger of actual poverty. She points out that developments during the last generation or so have greatly weakened the power of this incentive. The possession of wealth, she claims, no longer is as highly regarded as it was in the past. The prestige of the educated person in society has also diminished, and the attainment of an education is not dependent on the wealth of the parents. In addition, medical services are available to all, and domestic help is not a prerequisite to social status. "When bishops and judges announce publicly that they have to help their wives with the washing-up, there ceases to be any social stigma attached to loss of ability to employ a domestic staff" (p. 18). All in all, "The penalties for lack of success, and equally for lack of effort to succeed, which attach to the middle classes today are thus as much reduced as those which attach to the poorer sections of the community . . ." (p. 19).

The decline in the power of these incentives based on fear has placed added importance on the incentives based on gain, if the deterioration in the desire to work hard and to save, now evident in Britain, is to be checked or reversed. Unfortunately, however, public policy in Britain has also tended to erode these incentives. "The virtual impossibility of accumulating capital, or of making large-scale provision of wealth for future generations, or even for the saver's own immediate future, without losing through taxation and inflation the greater part of the money saved is naturally the most potent of the present forms of discouragement of effort based on the desire for gain" (p. 22). These effects have been compounded by the prevailing system of rationing

scarce goods which means that the acquisition of money does not result in the early possession of goods or benefits accrued.

Partly as a means of restoring incentives and partly in order to accomplish other objectives, one of which is to improve the equity of the tax structure, the author argues for a sweeping revision of the British tax structure and the existing program of social insurance fees and benefits. She describes her proposal in the following terms (p. 128):

> It consists in a merger between the income tax and the social insurance systems, as a result of which all contributions would in future be made in the form of income tax [with proportional rates and no exemptions] payable upon all the income of the individual whether earned or unearned. In compensation for the loss of the present allowances of untaxed income there would be granted weekly cash allowances, payable to every individual, on the lines of the present children's allowances. These would be in substitution for all (or part) of the present insurance benefits.

The author would limit to the nonwelfare portions of the national budget the use of supplementary income taxation, and even for this portion of the budget she approves only grudgingly the principle of progressive taxation. She states (p. 66):

> . . . the purpose of redistributing income for social purposes is not an object with a moral validity of its own. It requires national emergency to sanction it, and it cannot, without disaster, form part of a permanent system of taxation. The robbery of one group of citizens by another, even when the State, democratically controlled by the first group, acts as its agent in carrying out the theft, remains—theft.

Space limitations preclude a more detailed summary of the author's thesis and of the rationale behind it. A critical evaluation of the volume is extremely difficult for an American reviewer not familiar with the British scene. These difficulties are increased by the fact that the author herself presents essentially a summary statement of her own views and conclusions rather than a full discussion of the factual evidence underlying these conclusions.

In general, the views expressed on work and savings incentives in Britain sound persuasive and consistent with those expressed by others. The standards of tax equity applied by the author, however, appear much more arbitrary, and probably would not be widely accepted either in this country or in Britain. Likewise, the author's excursions into side questions, such as her discussion of the international factors which affect British taxation policy, contain judgments which this reviewer believes to be of questionable validity.

Perhaps the most interesting feature of the book for American readers is the contrast between Lady Rhys-Williams' view on the British incentives and the evidence as to work and savings incentives in this country. Studies of the American scene indicate that no such deterioration has occurred as Lady Rhys-Williams believes to have taken place in Britain.

J. KEITH BUTTERS

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The Taxation of Corporate Income in Canada. By J. RICHARDS PETRIE. (Toronto: University of Toronto Press. 1952. Pp. xviii, 380. $7.50.)

Dr. Petrie's study is one of a series of volumes on taxation in Canada, sponsored by the Canadian Tax Foundation. After an introductory chapter in which the author makes it clear that taxation, in his view, is an improper instrument for social and economic control and presents the major conclusions drawn from his analysis of the corporate income tax, there is an interesting and informative review of the history and development of the application of this tax in Canada. Succeeding chapters deal with the rationale of the taxation of corporate income, its incidence and economic effects, problems related to the treatment of business losses and the valuation of assets, and the integration of the corporate and personal income taxes. Petrie concludes with a description and evaluation of Canada's efforts to restrain inflation in part through the use of deferred depreciation of new nondefense-related private investment.

Petrie agrees with the "traditional" view that a business profits tax, since it "does not enter as a cost of production in any usual sense of the word" (p. 128), is not shifted. Unfortunately much of the supporting reasoning is based on the concept of the "marginal firm" and its rôle in the market, rather than upon marginal output. The statement made in the course of the analysis that, "If, during a given period, demand and costs remain constant, the only factor that can change price is a change in supply" (p. 126), leaves one wondering about the nature of a supply schedule that is capable of shifting independently of costs!

There is, apparently, some uneasiness in the author's mind at this point, for he suggests, quite without explicit reference to oligopoly or administered prices, that "In a strong sellers' market the tax is undoubtedly shifted in many cases" (p. 143). Thus if there is excess demand at the prevailing price, that price may rise. But it does not follow that this will occur only if the corporate income tax rate is raised; even if the rise in the tax rate is a necessary condition for the price increase, this does not necessarily constitute "shifting" in any really meaningful sense.

A wide range of topics is discussed under the heading of economic effects. These include the problem of double taxation and the effects of the corporate income tax on saving and investment, distribution of earnings, corporate financing, the choice of business organization, prices in the long run, and small business and new enterprises. Only occasionally are definitive conclusions drawn, for the data required for adequate analysis are generally not available.

There is, however, one conclusion that must be seriously questioned. Petrie cites data for the years 1938 to 1950 to "prove" that the higher the effective tax rate, the higher will be the proportion of corporate profits after taxes that will be retained (p. 162). This reviewer found the coefficient of correlation between the tax rate and the percentage of after-tax profits retained to be significant and equal to .61. But the examination of the data (p. 160) reveals that the percentage of profits retained also tends to vary closely with the *amount* of profits after taxes. The latter continued to increase as tax rates

were raised, resulting in what appears to be covariance rather than correlation between tax rates and corporate retentions. The data reveal too that while undistributed profits as a percentage of profits after taxes moved in a direction opposite to that of the tax rate for five of the thirteen years, it changed in the same direction as the amount of profits after tax in all but three of those years.

In the absence of graduated rates the problem of averaging for corporate income tax purposes is relatively simple and, in Petrie's view, should be solved by permitting a limited carry-back and, logically, unlimited carry-forward of losses. In the case of corporations whose shares are actively traded, however, there is much to be said for letting "bygones be bygones," to use Simons' phrase on this point.[1] There is always the prospect that the stockholders in profitable years may not be the ones who owned the shares when the losses were incurred, in which case one must ask what manner of equity this rough averaging achieves.

Petrie believes that methods of inventory valuation and the timing of depreciation properly belong within the jurisdiction of corporate management. Cases of fraud are, of course, the proper concern of the tax administrator, but beyond that there seems little to gain and perhaps much to be lost through the use of bureaucratically established procedures. The argument for basing depreciation charges on replacement costs is well disposed of. Those are charges which are designed solely for the purpose of enabling the historical capital cost of a depreciable asset to be amortized out of income (p. 237). Any other approach is suspect and involves spurious reasoning.

In the interests of equity Petrie is compelled to discuss integration of the corporate and personal income taxes, a problem that is particularly acute in Canada because of the absence of a tax on capital gains. The only complete and logically satisfactory plan would call for elimination of the tax on corporate income as such and the taxing to the shareholder of his aliquot portion of corporate profits. "Practical" difficulties, however, preclude total integration, in the author's view, and thus make it necessary to adopt some compromise plan. After rejecting the various well-known proposals, however, he fails to offer any specific solution, and the reader is left with the impression that a long chapter has accomplished nothing save another reviewing of the pros and cons relating to these proposals.

For the American reader familiar with the general literature on the corporate income tax the most interesting and useful part of the book is the discussion of Canadian practice in this revenue field in Chapter 2 and scatteringly throughout the book. Canada has been willing, particularly in recent years, to adopt innovations which, although they do not always appear to represent wise or equitable procedures, indicate recognition by the government of the principal shortcomings and undesirable effects of the tax and a disposition to alleviate them.

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[1] H. C. Simons, *Federal Tax Reform* (Chicago, 1950), p. 22.

International Economics

Economic Planning for the Peace. By E. F. PENROSE. (Princeton: Princeton University Press. 1953. Pp. xiv, 384. $7.50.)

One of the unprecedented phenomena of World War II was the scale of the activity that was carried on in Washington, London, and Ottawa in preparing for the peace while the war was still in progress. Before hostilities ceased not only had the Charter of the United Nations been negotiated, but international conferences at Hot Springs, Bretton Woods and Atlantic City had launched or laid the foundations for international cooperation in the fields of agriculture, international monetary and financial affairs, and relief and rehabilitation. By the end of 1945 the proposals on world trade and employment had been put forward, the British loan had been negotiated and large numbers of blueprints existed in various stages of completion for the terms of peace treaties, the treatment of ex-enemy countries and the restoration of liberated countries. Professor Penrose's volume is an account of large segments of these activities between 1941 and early 1947 as seen from London by one who participated in many of them. Its focus is an attempt to determine why and where the effort went awry, especially why despite all the planning, "economic disaster came early in Germany and was narrowly averted in 1947 and 1948 in the rest of Europe" (p. 3).

The search for the answer to this question is the unifying thread which ties together what are otherwise two quite dissimilar parts of the study. The first half of the volume is an account of the planning that went on during the war and is concerned with the long-range plans in the fields of financial and commercial policy, food and agriculture, and commodity policy as well as with the very short-range activities in the field of relief. The second half of the study is mainly concerned with policies toward Germany in the first two post-hostilities years, followed by two chapters on the problems and policies connected with the reconstruction of Western Europe from the Anglo-American loan to the eve of the Marshall Plan. The author was intimately and continuously associated with at least some aspects of all of the facets of postwar policy planning covered in the first half of the volume; apparently his connection with the events after 1945 was less close. It is presumably for this reason that the two parts of the study differ greatly in the mode of treatment of the subject matter. The first part is largely in the nature of personal memoirs and observations whereas the latter half is a more rounded account on the basis of publicly available documents. In these circumstances it is natural that the earlier chapters should be more spotty and less satisfactory as a complete account of the development of policy. It may also be the reason why the second part of the study conforms more consistently than does the first to the impressions of one who saw most of these developments from the Washington end. Nevertheless it is the first part of the volume which, although weak in its treatment and comprehension of the substantive issues, will probably be of the greatest value to the students of postwar economic policy because of the many hitherto unpublished incidents of discussions between American and British

officials which are here recorded. When the account ventures beyond the London scene into an interpretation of contemporaneous developments in Washington the reader will want to keep in mind the author's own warning that this history still remains to be written.

It is now ten years since the first of the international conferences concluded at Hot Springs its efforts to lay the basis for a viable and expanding world economy. Clearly the early realization of the objectives, so bravely stated there and subsequently, has in large measure been frustrated. Is this because unpredictable events have overwhelmed us? Was good planning nullified by failures of execution? Or was the planning itself basically ill-conceived and misdirected? On these, as on a host of extraneous matters ranging from the use of the atomic bomb to problems of negotiating with the Russians, the author's views are expressed with vigor and frequently in highly subjective and controversial terms. The text bristles with expletives such as "extraordinary ignorance," "irresponsible," "careless," etc. In general, it is his conclusion that, especially on the American side, the failures must be ascribed to the planning and to domestic politics.

The main elements in this conclusion may be summarized as follows: (1) There was too much emphasis on the establishment of long-run expansion and equilibrium and not enough on short-run and transitional problems which might necessitate policies quite antithetical to long-run objectives. (2) It was a mistake to separate long-range from short-run functions in international organizations; for example, relief and economic aid should have been administered through the International Monetary Fund and the International Bank and the resources of these institutions made adequate for the purpose. (3) There was insufficient appreciation in Washington of the magnitude of the task of restoring economic health in Europe. (4) Planning was frustrated by perversity and stupidity in Washington, especially in the Congress. (5) With respect to Germany, malice and ill-will in the Treasury and the Pentagon delayed action and almost led to disaster.

There will undoubtedly be a large measure of agreement on many of these conclusions. There will be less agreement on the extremes to which some of these conclusions are pushed and on some of the interpretations and evidence which are supposed to support the findings. This reviewer would be inclined to dispute the second and fourth of the conclusions and particularly to doubt the correctness of many of the interpretations leading to them.

It may have been unwise to separate the needs of relief and reconstruction from longer-range functions in international institutions. Whatever the wisdom, however, the author is quite incorrect in attributing this separation principally to a process of attrition and political compromise. Here as elsewhere throughout the volume, Penrose has a propensity for attributing decisions which were unpalatable to him to the perversity of the Washington political scene, to "political considerations," and to the form of the United States government, "which gives so many opportunities for irresponsible obstruction and consistently weights the scale in favor of conservatism" (p. 46). That interdepartmental coordination left much to be desired and that the

problems of securing Congressional assent were difficult and omnipresent will be confirmed by a host of civil servants. But it should also be recognized, as the author in his impatience does not, that the American people were emotionally ill-prepared for the responsibilities that were being thrust upon them and that the remarkable aspect of the record is that so much was approved, not that some proposals had to be foregone or modified. It is also of interest that what is viewed as obstruction in the United States apparently becomes virtue abroad; one can search the volume in vain for any recognition of the difficulties created by the British government's obsession with full employment policy. Perhaps the author's impatience stems in part from his disagreement with the orientation of American planning toward a freely operating and basically private economy, whereas his own hope for the post-war was an "economic order . . . developing fitfully . . . toward greater cooperation, public control, and public enterprise . . ." (p. 101).

It is also possible to agree that there may have been errors of attempting too much precision in drafting such codes of international economic behavior as the charters of the International Trade Organization and the International Monetary Fund. Simpler and broader rules might have made the codes more flexible and workable. But the study overlooks the fact that the complicated exceptions arose in most cases not from the American side, but as concessions to get as nearly universal acceptance as possible, rather than to create exclusive clubs of a few nations. Whatever the merits of this case, one need not be driven to the author's extreme position that the ideal form of international agreement is to be found in the platitudinous resolutions of the Hot Springs Conference on Food and Agriculture. On that basis agreement is always possible but it is open to grave doubt how significant or effective such agreement is.

As indicated above, the five chapters on the disastrous effects of the Morgenthau Plan on Germany and the internal contradictions of the basic directive to the occupying forces (JCS 1067) are the most satisfactory and comprehensive portion of the volume. Even so, some of the implicit assumptions and conclusions are open to qualification. Many of the policies toward Germany which were designed to prevent that country from again becoming a threat to the peace and to insure that the occupation should not at the outset have the welfare of the German people unduly at heart as compared to the position of the populations of the neighboring liberated countries were shared by many who dissented from the vengeful motives of the Morgenthau Plan. The account seems also to be unaware of Washington studies on reparation policy as early as 1943 which were very similar to those presented by Keynes which are noted in the volume. It is also open to question whether the German policy dealt a severe blow to the willingness of the U.S.S.R. to cooperate with the United States and the United Kingdom.

The general paucity of dates in the text is likely to prove confusing to many readers since events are treated topically rather than chronologically. It will also be regretted that there is no documentation of the major part of the narrative, possibly because most of the underlying documents are still classified in government archives. Without access to documents formerly in his files, the

reviewer is reluctant to cite numerous instances of fact and of interpretation on which his memory differs from the account set down here. Many a civil servant will be bemused, however, by the information that the proposals for an international trade charter had their origins in a memorandum by James Meade in the War Cabinet Secretariat in the latter part of 1942. They may also be astonished to learn that British officials were being informed that the United States was not seriously affected by imperial preferences but that our concern lay with the adverse effect of preferential systems on small and poor countries.

In addition to its other merits, this volume will serve a most useful purpose if it should stimulate the publication of complementary studies from different points of vantage before memories grow dim, since much that was significant was never committed to official paper.

LEROY D. STINEBOWER

Manhasset, N.Y.

International Trade and Economic Development. By JACOB VINER. Lectures delivered at the National University of Brazil in 1950. (Glencoe, Ill.: The Free Press. 1952. Pp. 154. $2.75.)

The small book contains six lectures which Professor Viner gave at the Getulio Vargas Foundation of the National University of Brazil in the summer of 1950. The subjects of the lectures are, with one exception, in the field in which Professor Viner has made many lasting contributions, *i.e.*, the theory of international trade and the practice of commercial policy. The first lecture, on the classical theory of international trade and present-day problems, is in part a comparison of the world and the world of ideas in which Ricardo and his contemporaries and successors formulated their theorems, and the present where the "cosmopolitan approach" of the classics no longer applies because today the conflict of economic interest between nations is taken for granted, and because economic policy can no longer be considered without express regard for strategic or security implications. This does not, however, invalidate the findings of the classics for their time; but it does call for their "adaptation to the new circumstances if not for outright rejection." The "new circumstances" mentioned are the decline of effective competition, the growth of central planning on a national scale, the establishment of new international institutions, the disappearance of the gold standard, and the increase in trade barriers through quotas, licenses, exchange controls, etc.

The next four lectures explore some of these "new circumstances," partly to deplore their emergence, and partly to show that they are not so important as to invalidate the classical doctrines.

Thus, Chapter 2 is a strong—if not to say, ill-tempered—attack on Metzler's exposition of the "new" theory of international trade in Metzler's chapter in the *Survey of Contemporary Economics,* Vol. I, based on the contentions that (a) the efficacy of the monetary mechanism has been underrated by "the Keynesians"; and (b) "true" price elasticities of demand are not as low as some empirical investigations have suggested. Chapter 3, entitled "Gains

from Foreign Trade," elaborates on the proposition that industrialization is not identical with economic development and that high income and welfare can be derived from agricultural pursuits. The fourth lecture comments on the relationship between monetary and fiscal policies on the one hand, and balance-of-payments problems on the other. It concludes that balance-of-payment pressures are inevitable wherever national economic policies "are designed to produce or inevitably involve inflation" and that under such conditions direct trade controls are likely to be the first and last resort for dealing with balance-of-payments deficits.

Chapter 5 deals with the influence of national economic planning on commercial policy and comes to the (not very startling) conclusion that "every internal direct control which has appreciable indirect influence on the course of foreign trade tends to make necessary a related direct control in the foreign trade field." It also comments on the International Trade Organization charter and the impossibility of devising rational principles governing trade relations between controlled and free countries, on the International Monetary Fund charter and its recognition of the sovereign "right to inflate," and on the difficulty of solving—"when the world at large has ceased to engage in systematic . . . inflation"—the problem of business cycles and their international transmission. In this connection, Viner voices objections against an international code of behavior to be applicable indiscriminately to all countries, and indicates his preference for an "international employment stabilization fund endowed with large resources in national currencies, and with a mandate to use these funds in making loans on a counter-cyclical pattern."

The last chapter, entitled "The Economics of Development," first struggles with the problem of defining the concept of "underdevelopment"—somewhat unnecessarily, it seems to this reviewer—and suggests that the reduction of mass poverty be made a crucial test of the realization of economic development. (I fail to see, however, why Viner believes himself to be in disagreement on this point with "the whole body of literature in the field.") He then lists the obstacles to economic development as (a) low productivity functions—caused by an unfavorable physical environment, illiteracy and low health standards, and lack of technical education; (b) scarcity of capital caused by a low propensity to save, and the limited availability of foreign capital; (c) the hindrances to international trade; and (d) rapid population growth.

The chapter and the book conclude with the rather pessimistic observation that even with the "utmost help from these external factors which there is any reasonable ground to expect," the problem of development will not be solved unless the underdeveloped countries undertake a "sound, large-scale and persistent attack on the basic internal causes of mass poverty."

Viner's lectures are a cornucopia of pertinent observations on a host of issues, although they are somewhat loosely joined together. Nevertheless, this reviewer cannot help expressing his personal regret that Viner has missed the opportunity to make a major contribution to the "economics of development." Most of his remarks and observations are peripheral to the hard core of the practical problems of economic development as they exist nowadays. The

problem of the relationship between economic development endeavors—this sound and persistent attack on mass poverty which Viner wants—and the balance of payments can be put, I believe, very simply; given (a) an agreement that it is in the interest of the world as a whole, or, at any rate, of the free world, that the per capita income of underdeveloped countries should rise at a faster rate than that of advanced countries—in order to bring about a decrease in the difference of per capita income and welfare between countries; (b) the empirically verified, or at least verifiable, fact that the income elasticity of demand for crude materials and foodstuffs which make up the bulk of the exports of underdeveloped countries is unity or less; and (c) the equally verified, or verifiable, fact that the income elasticity of the demand for imported capital and consumer goods in underdeveloped countries is at least unity—the problem arises: what mechanism of adjustment can be made operative, and what policies should be pursued by underdeveloped countries in order to maintain (or obtain) balance-of-payments equilibrium? Is an automatic adjustment possible which will not run counter to stipulation (a)? Unfortunately, Viner did not address himself to this problem and the problems of fiscal, monetary, exchange, and commercial policies which pertain to it.

JOHN H. ADLER

International Bank For
Reconstruction and Development

A Geometry of International Trade. By J. E. MEADE. (London: George Allen and Unwin, Ltd. New York: Macmillan. 1952. Pp. 112. $5.00.)

This is the latest in a series of monographs that mark Professor Meade's progress in his resolute march through the whole realm of international trade theory and policy. So far Volume I of *The Theory of International Economic Policy* has appeared under the title *The Balance of Payments* (see this *Review*, March 1952), along with a separate Mathematical Supplement. The present work is in the field of international trade proper as defined by classical and neoclassical writers, and is in the nature of a geometrical preface to the promised Volume II of *The Theory of International Economic Policy*.

This is a book for specialists in international trade: it presumes not only some general knowledge of "offer curves and all that," but some fairly sophisticated notions of what is wrong with them.

Allowing for the discontinuity between "no trade" and "some trade," an offer curve with welfare content for a two-country, two-product world can be derived under constant or decreasing costs directly from a family of community-indifference curves. The problem is to do the same thing under increasing costs, where partial rather than complete specialization is the rule, and product quantities vary continuously along a production-opportunity relationship with every variation in trade.

Meade solves this problem with the help of a construction called the "trade-indifference curve." A "production block," representing the production possibilities in one of the trading countries, is allowed to slide along a con-

sumption-indifference curve in such a way that the production and consumption indifference curves maintain tangency, and the axes of the production-indifference curve remain parallel to the corresponding axes of the consumption-indifference map. The trade-indifference curve is traced in the adjoining quadrant by the corner, or "origin end," of the production block. There is, of course, such a trade-indifference curve for each consumption-indifference curve. The slope of the trade-indifference curve at any point is the same as the slope of the "corresponding" consumption-indifference curve at the "corresponding" point, which in turn is equal to the slope of the (tangential) production-indifference curve at the same "corresponding" point. Hence an offer curve may be derived from the trade-indifference map by rotating a price line; the locus of the points of tangency between the price lines and the trade-indifference curves will be the offer curve corresponding to the given cost and preference conditions.

Meade applies the same method, by way of digression, to derive offer curves under constant and decreasing costs, thus subsuming these as special cases. The final results do not differ from standard procedure except that, if we assume partial specialization under decreasing costs (unstable except where due to great disparity in the size of the trading nations), his method shows us some interesting possibilities of multiple equilibrium.

The purpose of the book is explicitly restricted to pure geometrical representation with no attempt to apply the geometry to the solution of economic problems. Nevertheless, the main interest of the book to many readers will lie in its use of the offer curves to represent certain trading situations which, by their very names, are at least reminiscent of major problems in international trade theory and policy. These situations include equilibrium and deficit under free trade; equilibrium under various systems of duties and subsidies; and manipulation to achieve certain welfare goals, nationalist and cosmopolitan.

In addition to its direct contribution to foreign-trade geometry Meade's book supplies a useful diagrammatic background for graduate and advanced undergraduate teaching. The undergraduate, especially, will regard the fifty-one diagrams with misgiving; but, by rigorous selection, six or eight might be chosen as minimum equipment and used with advantage in classroom work.

DONALD B. MARSH

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Instability in Export Markets of Under-Developed Countries. Study prepared by the United Nations Department of Economic Affairs. (New York: Columbia University Press. 1952. Pp. vii, 94. $1.00.)

It has long been known that underdeveloped countries, because of their heavy dependence upon the export of raw materials and upon the import of manufactured goods, are highly sensitive to fluctuations in world markets and are subject to wide swings in their terms of trade. The resulting ups and downs in their balances of payments, which tend to be aggravated by cyclical swings in the inflow of foreign capital, have not only subjected the economies

of underdeveloped countries to substantial fluctuations in incomes, but have also made it exceedingly difficult for them to maintain a steady rate of development expenditures at home.

Although this situation has been commented upon in numerous publications and official reports,[1] few, if any, systematic attempts have as yet been made to measure, in comparative fashion, the magnitude of these balance-of-payments swings. Consequently, this United Nations report fills a long-standing gap in our statistical information. Eschewing analysis or policy recommendations is almost purely statistical; but within its narrowly defined limits it is exhaustive, and will be a useful source of information for specialists in this field.

More specifically, it provides answers, and does so with painstaking thoroughness, to the following questions: How large are fluctuations in prices, volume, and proceeds of exports of underdeveloped countries, classifying these fluctuations as year-to-year, cyclical, and long-term? What is the connection between fluctuations in prices, in volume, and in proceeds? What are the relations, if any, in these countries between variations in export proceeds and capital imports?

As might be expected, the fluctuations are impressive. For 25 representative commodities the within-year price fluctuations over the last half century average close to 27 per cent, the year-to-year close to 14 per cent, the cyclical about 13 per cent per annum, and long-term about 4½ per cent per annum.

A surprising conclusion is that price fluctuations are not the major factor in the instability of export proceeds; on the whole, the volume of exports has fluctuated even more than the price, both in respect to cyclical[2] and long-term variations, averaging close to 19 per cent and 17 per cent respectively. For all types of fluctuations—year-to-year, cyclical, and long-term—export proceeds have wider swings than either those in price or volume alone, indicating that changes in volume do not offset those in price. Indeed, year-to-year fluctuations in volume are often more than twice as high as in price and, therefore, result in instability of export proceeds even when fluctuations in volume and in price are in opposite directions.

The lack of any general relation between the direction of price changes and that of volume changes arises from the grouping together of food and industrial raw materials. Once these groups are separated, we find that food changes in price and volume tend to move in opposite directions, indicating—but uncertainly, as the tendency is weak—the predominance of changes in supply as the causal factor. For industrial raw materials, however, fluctuations in price and volume generally move togther, suggesting that here changes in demand may be the important factor.

[1] Attention might be called in particular to the two well-known studies of the United Nations, *Measures for the Economic Development of Under-Developed Countries* (May 1951,) and *Measures for International Economic Stability* (November 1951).

[2] It might have been well to insert a footnote explaining why, in the trend from which cyclical deviations are measured, a seven-year moving average was used when the price and volume cycles averaged about four years. If the cycles were too irregular for a four-year moving average, might not a mathematical curve have been more suitable?

Since the purpose of the study was to investigate the ability of underdeveloped countries to obtain foreign exchange, it was necessary to obtain data on capital movements and invisible earnings. Before 1939, receipts from long-term gross capital imports averaged about 10 per cent of the value of export receipts. Over the same period invisible earnings averaged between 1 per cent and 3 per cent. In the postwar period invisible earnings increased somewhat because of tourist expenditure, but long-term international investment was generally lower. However, for the half century as a whole, not only did capital movements and invisible earnings fail to compensate for the instability of export proceeds, but they fluctuated more than three times as much as export proceeds and, as might be expected, generally fluctuated in the same direction, thereby aggravating the instability of receipts of foreign exchange.

It is only to be expected that the authors were sometimes handicapped by the absence of certain data, and to that extent they had to trim the statistics to the available material. One wonders if this situation was responsible for comparing the within-year[3] fluctuations for prices only; or for South Africa, New Zealand, and Australia being—surprisingly enough—entered as underdeveloped countries for the first time in the last chapter (which is concerned with a comparison between export proceeds and capital movements), while many of the underdeveloped countries included in previous chapters are now left out. And is it entirely responsible for a succession of tables in which the number of countries, the number of commodities, and to a lesser degree, the number of years are almost invariably different? At any rate, the utmost in attentiveness is required of the reader, whose task is made no easier by the complete absence of any visual representation.

Though it is unfair to criticize a work for not going beyond its explicit terms of inquiry, it is not irrelevant to discuss the usefulness of the inquiry in its present form. We have mentioned the specific questions this report endeavors to answer. It may be doubted, however, if many would think to ask these questions in quite so restricted a manner. The report is assuredly of value when supplemented by some additional data. Standing alone, it falls short of what is necessary to convey a complete picture. For large fluctuations in exports assume importance only as exports become a significant proportion of national income, and of this desideratum there is nothing in the report. A brief comparison, between underdeveloped and other countries, of the magnitude of the export fluctuations, and of the ratio of exports to national income, would have been a useful addition.

Another question in this connection is what is the proportion of the total crop, or of the total output of materials, which is exported by the various countries? Does the proportion exported vary according to the price: for example, will a low price induce producers of some crop to retain a larger part

[3] Within-year fluctuations are not necessarily coincident with seasonal variations. The percentage within-year fluctuation is the difference between the highest and lowest price in the year expressed as a percentage of the highest price (in this study every change is expressed as a percentage of the higher price).

for their own use or consumption, in this way alleviating the hardship occasioned by their reduced money incomes?

Of course, it may well be that in all these countries the proportion of total output exported is large and that exports are a large and constant proportion of national income, and that these facts are known to anyone having a rudimentary acquaintance with underdeveloped countries. Yet it would require little extra labor to have provided data such as these to enable the interested "outsider" to form a more balanced appreciation of the impact on these weaker economies of the strain of large fluctuations.

Though the report engages in hardly any analysis and makes no recommendations, there can be little doubt that the authors are of the opinion that fluctuations are a decided obstacle in the development of these countries. Without opposing this view one can see how the desire to bring these important facts to the attention of the public may have led them, inadvertently, to take occasionally a rather odd position.

For example, in an introductory paragraph we read that: "A degree of fluctuation such as that indicated by this study threatens underdeveloped countries with inflation in both prosperity and depression. During recessions, reduction in export proceeds and balance of payments deficits encourage the devaluation of currencies or restriction of imports; both measures may increase inflationary pressure on prices. Conversely, the money income of exporters may expand so rapidly in times of increased demand that domestic controls become inadequate to prevent inflation. . . ."

Surely this is making the worst of both worlds! If during a recession an import surplus ensues, the result may be an internal deflation. This would be symmetrical with a resulting inflation when the country has an export surplus. On the other hand, if, for argument's sake, we allow the country with an import surplus to devalue its currency (or restrict imports), thereby courting inflation, we must, by the same logic, allow that if it revalues its currency (or removes import restrictions) when the value of exports expands, it exerts a deflationary pressure. There may, of course, be factors which render a symmetrical analysis of this sort inapplicable for many of the underdeveloped countries. If so, it would be more convincing to indicate their nature at this juncture rather than to lean so heavily on the indulgence of the sympathetic reader.

On page 20, after telling us that there were continuous long-term trends ". . . resulting in total changes in commodity prices which were greater than the normal total cyclical amplitude," we meet with the remark "clearly in respect of long-term projects or long-term planning, a steady and persistent adverse long-term trend can be just as destructive of stability as shorter-term fluctuations." Now this opinion, as it stands, is not easily acceptable. The concern with stability *per se* can be taken too far. After all, there is a presumption that the price mechanism has a rôle to fulfil in the economy: and though a good case can be made for reducing short-term fluctuations, it is usually made with a proviso that long-term trends should be allowed to prevail.

The attempt in Chapter 5 to impute the respective contributions of price variation and volume variation to variations in export proceeds may be a

neat way of summarizing the main results of previous chapters, but we must be aware of slipping into unwarranted inferences. To illustrate, on page 62 there is the following paragraph: "Price stabilization alone, without stabilization in volume, would, therefore, have reduced the cyclical instability of proceeds by only ¼. Similarly, stabilization in volume, without price stabilization, would have reduced the cyclical instability of proceeds by only ⅓. In both cases, other things being equal, the major part of existing cyclical instability would have remained in spite of such partial stabilization."

From the observation that partial stabilization is inadequate, we may unthinkingly draw the conclusion that stabilization of both price and volume is required. But in some cases, where changes in supply are largely responsible for fluctuation in export proceeds, stabilization may be effectively increased, not by adding volume stabilization to price stabilization, but by removing price stabilization entirely. This is at once recognizable in the limiting case of an import elasticity of demand equal to unity.

But, after all criticisms have been made—and many of them are really in the nature of a request that the scope of the report be enlarged—anything said, or left unsaid, should not be allowed to detract from what, by any standards, is a solid achievement in applied statistics.

E. J. MISHAN

Federal Reserve Bank of New York

Ausgleichsgesetze der Amerikanischen Zahlungsbilanz. By JÜRG NIEHANS. (Berne: A. Francke. 1951. Pp. x, 173. Sw. fr. 9.50.)

The author attempts to make general price theory the basis of quantitative forecasting in the field of international economics. In particular, he wants to find some "economic laws" to explain the movements leading to an equilibrium in the U.S. balance of payments. In the first, theoretical, part of his book he defines "equilibrium" and "disequilibrium" in the balance of payments as absence or presence of divergencies between intended and actual international transactions. He divides equilibrating movements into "visible" and "invisible" ones (depending upon the possibility of actual verification in balance of payments statistics), subdividing the "visible" movements into "monetary" and "administrative" ones (depending upon their effects on "freedom" of private international market transactions). Finally, he distinguishes primary, secondary, and tertiary consequences of equilibrating movements. The first category includes effects on prices and quantities of goods and services entering international transactions and depends mainly on the price elasticity of demand for these goods and services. The second includes effects of primary changes on incomes as well as on prices and quantities of other goods and services. The third includes effects of primary and secondary changes on the future decisions of producers and consumers.

In the second, quantitative, part of the book, the author tries to estimate price elasticities for U. S. imports and for U. S. foreign travel expenditures, primarily on the basis of data covering the period from the middle of 1947 to the beginning of 1949. He analyzes 18 commodity groups, which accounted in

1948 for 46 per cent of all U. S. imports, comparing in most cases the volume of imports with the relation between domestic and import prices. He comes to the conclusion that about half of the goods have a short-run elasticity of less than unity, and about one-fourth an elasticity of more than unity while the elasticity of the rest is either unity or indeterminate; however, almost two-thirds of the goods have a long-run elasticity equal to or greater than unity. The author also calculates that foreign travel has an elasticity of more than unity.

Analyzing the relations between imports and exports as well as between imports and national income, and observing the modest rôle of foreign exchange in the U. S. banking system, the author finds that changes in U. S. imports have negligible secondary and very small tertiary consequences. The net effects of changes in U. S. imports are therefore virtually identical with their primary consequences and thus determined by the price elasticity of demand for the affected goods and services. For this reason, the trading partners of the United States can hope to raise their total dollar earnings only by means of selective rather than indiscriminate reductions in the prices of their export goods (or even in U. S. tariff duties). The author advises the European countries to concentrate on technological progress so as to be able to export "newly invented" goods to the United States.

The author performs a useful service by applying good old-fashioned price analysis to the most pressing problem of modern international economic theory and policy, and his conclusions conform to common sense. However, the statistical basis of the study is far too narrow to furnish conclusive evidence for his estimates of price elasticities and thus for the validity of his practical conclusions. Nevertheless, in a world which abounds in facile generalizations on the future of the U. S. balance of payments, it is refreshing to encounter a conscientious attempt to bring the discussion back into the confines of scientific method and quantitative measurement.

J. H. FURTH

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International Economics. By CHARLES P. KINDLEBERGER. (Homewood, Illinois: Richard D. Irwin. 1953. Pp. xx, 543. $6.00.)

This comprehensive work integrates the newer developments in the theory of international trade and finance with standard classical doctrine in so far as the state of our knowledge permits. It employs the analytical approach and consistently applies theoretical tools to the problems of the real world. Descriptive material on bills of exchange, gold standard, etc., has been held to a minimum and the treatment of institutions is shorter than in most textbooks. The style is clear and sprightly, considering the difficult and complex nature of the subject matter.

The organization is excellent. In Part I, the necessary groundwork dealing with balance of payments, foreign exchange markets and elements of the adjustment process are held to 75 pages. Part II covers the heart of foreign trade theory and its application to commercial policy. Part III deals with

capital movements and the process of economic development. Part IV, which is about one-fifth of the book, treats the forces of disequilibrium and the means of adjustment.

The two key chapters, on (1) the price mechanism and classical assumptions and (2) income changes and the multiplier, include 22 diagrams and several tabular illustrations which will facilitate the teaching of these subjects.

In addition to the customary subjects, the tariff chapter deals with the terms of trade, factor returns and redistribution of income. "Trade substitutes for factor movements. Imports reduce the scarcity of the scarce factor; exports lessen the redundancy of the plentiful factor. . . . More than simple redistribution between industries is involved. . . . Labor intensive types of manufacturing—shoes, textiles, pottery, hat bodies, etc.—are the strongest proponents of tariff protection. Large scale manufacturing in mass-production industries, on the other hand, employs a predominance of the abundant factor, capital, and is identified with exports. As capital became more plentiful than land and as the role of agriculture products in exports shrank, large scale manufacturing industry swung from protectionism to export-mindedness, and agriculture from free trade to protection. This explains much of the reversal in United States trade policy" (pp. 200-01).

A chapter on monopolistic discrimination and two chapters on quotas, state trading and exchange controls emphasize the importance of these devices in the world today. Exchange controls against scarce currencies are treated rather fully and Frisch's trade matrix is explained. Under certain conditions, discrimination may reduce total trade less than would proportional reductions in trade. The final chapter of Part II on "The Case for Free Multilateral Trade" brings out the difficulty of putting Humpty-Dumpty together again. "The condition that every country have a balance in its international accounts or reserves large enough to cover its gross deficits in inconvertible currencies has given us an example of the fallacy of composition. Each country has to run the risk of losing a lot—its reserves—in order to achieve a problematical gain-convertibility—which accrues as much or more to others" (p. 280). The discussion is enriched by an all too brief evaluation of the risks of multilateralism in a dynamic world of imperfect markets.

Almost 100 pages are devoted to capital movements, the transfer process, and economic development. The classical explanation of the transfer process is criticized and the modern theory expounded. An effort is made to cope with the intricacies of the terms of trade with the conclusion that something can be said, but not much that is conclusive. The stages of economic development in relation to factor proportions and balance of payments receive the attention that seems to be warranted by interest in the problems of growth.

The last 130 pages (Part IV) are devoted to disequilibria and the means of adjustment. Here Kindleberger breaks new ground in the treatment of structural disequilibrium at the factor level and the spending of inconvertible foreign currencies on higher priced goods. This is only incidental, however, to a full review of the appropriate measures to correct disturbances.

Cyclical disequilibrium may arise from differences (1) in the international timing of business fluctuations, (2) in income elasticities, and (3) in price elasticities. Depreciation, deflation and import controls are each regarded as unsuitable remedies. This leaves short-term lending. But cyclical disequilibria do not balance out over the full cycle. For this reason, secular disturbances must be eliminated before the International Monetary Fund can function effectively (p. 433). With respect to secular unbalance, Kindleberger believes that the International Bank and Point Four may have increased the disequilibrium by encouraging boldness in the ambitions and investment plans of young countries.

In the early stage of national growth, planned domestic investment tends to exceed savings, and imports to exceed exports. Secular disequilibrium will arise because the import surplus tends to exceed the foreign capital available for financing it. With the young creditor nation, planned savings tend to exceed domestic investment and exports to outrun imports. To restore balance, Kindleberger tries out exchange rate adjustment, tariffs and other controls. He concludes that "the major remedies are deflation and borrowing in the young countries; maintenance of income and lending in the developed (p. 451).

Structural disequilibrium is the result of wars, crop failures, changes in techniques, taste, etc. The acute difficulty arises when the standard of living must be reduced. The classical medicine is to avoid inflation and depreciate the exchange rate. But when the dislocations are large and resources are rather immobile, a certain amount of inflation may facilitate the process of shifting resources during the period of adjustment to lower levels of living and investment. Kindleberger believes that the planners' prescription may work in the early and acute stages, but as the relocation of resources gets under way, the liberal prescription is called for. The use of quotas will do much more harm in the case of structural disequilibria than in the case of short-term cyclical disturbances.

Kindleberger has carried the analysis of structural disturbances to the factor level. Labor is likely to be overpriced and capital underpriced. "Balance in the balance of payments may still be possible, but only at the cost of unemployed labor . . . the income generated by the employment of the excess labor would spill over into imports and upset the previous adjustment" (p. 461). The deflationary policy of the Italian government under the European Recovery Program has gone far towards balancing the international accounts, but has left structural unemployment.

Clearly, it is desirable to equalize factor returns within the country, but this is hard to achieve. Political and social as well as economic adjustments are required. The difficulty with the prescription of lower wages and higher interest rates "is likely to be that it will not work" (p. 465). Workers may prefer unemployment and it is by no means clear that business will substitute labor for capital at lower wages and higher interest rates.

In a concise review of the European Recovery Plan, the author correctly points out that circular reasoning is involved in using balance of payments analysis to determine the level of American aid. He finds that the argument

that suppressed inflation must end in open inflation is not supported by the European experience.

The concluding chapter sums up what can be done with the four disequilibria—cyclical, secular, structural goods level and structural factor level. The four means of adjustment are trade restrictions, capital movements, price and income changes. "Trade restrictions are to be avoided, capital movements can be regarded as a way of buying time" (p. 502). This leaves the field chiefly to fiscal policy and depreciation of the exchanges.

At a highly abstract level it would seem that structural disturbances could be handled by price changes and cyclical and secular disturbances by fiscal and monetary policy. Some of the problems are that: (1) One country alone will have difficulty during cyclical and secular disequilibria with fiscal and monetary measures; (2) The cyclical remedy may not work unless the secular disequilibrium has been corrected; (3) The price system may correct structural disequilibrium at the goods level or it may shift resources chiefly to industries producing for domestic consumption. In the last case, depreciation will be needed.

What is most undesirable is inflation balanced by quota restrictions. The conclusion is that there is no one sovereign remedy. The world should work toward the restoration of mobility of resources, revive lending, and maintain fairly stable exchanges. "Cases will still occur in which trade controls are unavoidable."

The author has performed a service in bringing together the old and the new in the field of international economics. The relevance of theory to policy is demonstrated throughout the last half of the book. By infusing the analytical treatment with a fair degree of realism, more questions are raised than can be answered. The important thing is that the tools of analysis are brought to bear on the problems in an orderly way.

The annotated bibliography is extremely useful. Surely this is the way bibliography should be handled in textbooks. The comments are brief but enlightening and stimulate further reading. Graduate students and others who have been unable to keep up in the field will appreciate this feature.

The book, I believe, will be widely welcomed as a text. The only question is whether it is too difficult for undergraduates. The liberal use of diagrams is helpful on this score. The work probably covers too much ground for a one-semester course, but there should be no difficulty in omitting certain chapters.

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International Economic Organizations. By C. H. ALEXANDROWICZ. Published under the auspices of the London Institute of World Affairs. (New York: Frederick A. Praeger. 1953. Pp. xii, 263. $6.00.)

Although some of the present international economic organizations originated in the last century, *e.g.,* the International Telecommunication Union and the Universal Postal Union, their proliferation became most evident during the past decade. Professor Alexandrowicz' study attempts a summary of

their internal administrative structures, as well as their main economic objectives and achievements. That this is no easy task to compress into less than 300 pages can be seen from his list of abbreviations, covering some forty agencies, both worldwide and regional. Paticular attention is given to the gold standard and international cartels, representative of privately initiated international organization; quasi-public groups such as the International Co-operative Alliance, the International Chamber of Commerce, and the Bank for International Settlements; and the Bretton Woods agencies, the International Trade Organization (never ratified), the International Labour Organization, and the U.N. Economic and Social Council, international organizations at the government level.

Because of space limitations, the descriptions are hardly more than summaries, with many necessary qualifying remarks omitted. Hence the reader should be fairly well informed about the general economic background during the past 75 years in order to comprehend and assess the author's judgments, such as those about the gold standard mechanism. Otherwise he may get a somewhat distorted picture; the International Monetary Fund, for example, is made to appear in too unfavorable a light.

The order in which the agencies are treated emphasizes two themes: the gradual development of the tendency to organize internationally to cope with the emerging economic problems, and the increasing tendency for governments to play a more important rôle as the functions shifted from the technical to the policy-making, private and short-term planning developing into public and longer-term planning. For example, the informal central bank cooperation within the gold standard has given way to the formal representation of Treasury officials on the International Monetary Fund. This frequent use of the pre-1914 gold standard as a yardstick makes one feel that the author's ideal would be a supergovernmental agency run by international civil service experts according to set rules, with the "power politics" departments, such as the Foreign Offices, excluded, since these are too nationally minded.

A characteristic of the period since World War II has been the increased decentralization of functions among many agencies, in contrast to the greater centralization within one, such as the interwar League of Nations, or Lord Keynes' proposed International Clearing Union. Part of this the author attributes to the excessive zeal for new agencies resulting from "an inherent trend towards an expanding international bureaucracy."

Cooperation among nations depends on whether or not isolation can be afforded, or alternatively, whether the administering agency can force compliance through the threat of withdrawal of its services. The coal shortage enabled the European Coal Organization to succeed; the lack of similar effective sanctions has weakened other agencies, *e.g.*, the inadequacy of the International Monetary Fund's resources relative to the size of the dollar shortage. (Under the gold standard the desire to maintain a fairly rigid gold value for the country's currency served as the necessary sanction to keep members "in line.") Hence it would be better not to have any organization than a meaningless and ineffective one, for the lack of any organization would highlight the

fact that the problem involved was still unsettled, so that it might be tackled again at a later, more appropriate time.

The author points out that in aiding underdeveloped areas, some government intervention is needed where private initiative will not step in; but too much may be just as great a hindrance to developmental cooperation as too little. In fact, world community building is hindered whenever there is government intervention, even internally, for its policies as a member of an international organization will be designed to protect its own domestic planning, rather than being aimed at the broader issues.

Unfortunately, the book has many shortcomings, which a carefully edited reissue could overcome. Most serious is the complete omission of the repercussions of the Korean invasion (although unconnected post-Korean developments like the European Payments Union are discussed). For example, the author does not treat the U. S. government's price controversies with the tin and rubber producers in his sections on those commodities. No mention is made of the International Materials Conference.

The organization of the book could be improved considerably, too. Although the emphasis is on the organizational structure of each agency, there are many short asides—often at irrelevant places—on general principles inferred from these individual studies. Greater space than a sentence or two should have been allotted the interwar League-sponsored loans guaranteed by other than the debtor government, and the international trade union movement. Errors in style, such as the use of four different titles for the Export-Import Bank in Chapter 13 (*e.g.*, United States State Bank) should also be corrected, as well as mistakes in several of the descriptions.

Despite these minor defects, the book should serve as a compact introduction to the subject, and as a guide to the reader interested in learning more about the agencies discussed. As the author remarks, "the interest of the international lawyer and of the international economist coincide, as the structure of the organization is particularly essential for the performance of its functions."

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Business Administration

City Milk Distribution. By R. G. BRESSLER, JR. (Cambridge: Harvard University Press. 1952. Pp. xii, 398. $6.00.)

In this exceptionally interesting analysis Bressler evaluates several proposals for improving the efficiency of milk distribution. Since he considers only the movement of fluid milk in bottles or containers from processing plant to consumer, his field of study is fairly narrow. The flow of milk from farm to plant, distribution to consumers through restaurants and other "institutions," and the marketing of other dairy products, all lie outside his subject. Geographically, his field studies have been restricted to Connecticut, so that here

too the area of analysis is narrow. What he has lost in breadth, however, is more than made up by the depth to which he probes.

The general nature of the study is set when he defines efficiency as a ratio between input and output. Given this definition, his problem becomes one of finding out how the proposals to be evaluated would change the present input-output ratios in a number of sample markets. The unit of output taken is simply a quart of milk delivered to the consumer. For some purposes quarts delivered to the consumer's home are treated as equivalent to quarts handed across the counter of a retail store; for other purposes they are defined as different units of output. The unit of input measured is an aggregate of cents' worth of route-labor cost, route-truck cost, and processing-plant cost per quart of milk delivered.

Nearly all the data were collected during 1940, 1941 and 1942 in the course of a study of milk distribution made under Bressler's direction at the Agricultural Experiment Station in Storrs, Connecticut. Much of the material has already been published in a series of short reports issued under the general title *Efficiency of Milk Marketing*. Considerable sections of the book under review are quoted almost verbatim from these reports. It is much more than a scissors-and-paste assembly, however, and should be approached as an essentially new and significant book.

Bressler's primary concern is a belief that the present mixture of competition and monopoly has resulted in a wasteful duplication of delivery routes and plants, as well as in a waste of manpower for unnecessary or even undesirable competitive selling. He undertakes to measure the waste by seeing how much costs would be cut by each of the following methods of reducing excess capacity: substitution of alternate-day for daily deliveries; rearranging routes so as to give each present plant an exclusive territory or a territory shared with only one or two other plants; converting the delivery of milk within a given city into a monopoly with a single plant and no duplication of routes, the concern to be operated either under regulations appropriate to a public utility or as a municipally owned and operated enterprise; and elimination of house-to-house delivery so that all consumers must buy their milk in retail stores.

In measuring the probable effects of such changes, Bressler first makes a detailed cost allocation. He then works out a long series of equations relating cost of delivery per quart to such variables as quantity of milk delivered per mile of roads and streets in a given market; quantity delivered per mile of delivery routes, including duplications; the size of a processing plant; and the proportion of processing-plant capacity used. In a third step the effects of the proposed changes upon deliveries per mile and upon plant utilization are computed. Finally, the equations translate these effects into costs per quart delivered.

Bressler concludes that the introduction of alternate-day deliveries has already reduced costs by 1.8 to 2.6 cents per quart in the markets studied, as compared with what they would be under a system of daily deliveries. Each of the other proposals for reorganization would reduce costs still further, the

maximum advantage being obtainable under a municipally owned monopoly. Such a monopoly would reduce costs by an additional amount ranging from 2.3 to 4 cents a quart in the various markets. Substitution of store sales for house-to-house deliveries, if reinforced by a reorganization of wholesale delivery routes, would cut costs still further by an amount on the order of 2.4 cents a quart. From a somewhat limited field survey, it is concluded that most consumers would approve of the various changes in return for the estimated savings, except as regards elimination of house-to-house deliveries.

The space here available precludes a detailed evaluation of the methods Bressler uses and of the conclusions to which he comes. Two precautionary notes must suffice: First, although the methods used in allocating costs are well defended, they rest upon a host of debatable assumptions, estimates, and judgments. Secondly, the conclusions reached cannot serve as a basis for action in a specific market without bringing back into account many factors eliminated by the definition of the problem or touched very lightly in the analysis.

Despite these limitations the book makes an important contribution to the literature of marketing. It deserves wide reading, especially among those concerned with the statement so often made that marketing is inefficient and wasteful. Not only in its conclusions, but in its approach and methods, it marks a significant advance toward reducing that naggingly persistent question, "Does distribution cost too much?" to forms capable of meaningful measurement.

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Studies in Costing. Edited by DAVID SOLOMONS. (London: Sweet and Maxwell. 1952. Pp. xii, 643. $5.95.)

This book, a companion volume to *Studies in Accounting* by W. T. Baxter, is published on behalf of the Association of University Teachers of Accounting. With the main purpose of providing supplementary readings for accounting students, the editor, a member of the faculty of the London School of Economics, has collected what seemed to him to be the best contributions on cost accounting in the English language during the last twenty years. This reviewer believes that a number of these essays will be of value to students of economics, and that the book should also appeal to professional accountants and industrial engineers. The twenty-six articles selected are almost evenly divided between British and American authors and consist mainly of critical discussions of principles. A rough classification of the essays by authors shows that eight were written by economists; five by teachers of accounting; three each by public accountants, industrialists, and the committee on research of the National Association of Cost Accountants; the remaining four by engineers and teachers of law and history.

The first section contains two articles on the history of cost accounting. The essay by Solomons shows how the need for cost records came with the factory system and the great increase in the size and complexity of modern business. The distinction between fixed and variable costs was recognized by both

economists and accountants at an early date. In the beginning, records were kept for material and labor costs and crude estimates for overhead were added. Hamilton Church made important contributions with his ideas of production centers, burden distribution, and a supplementary rate to take care of idle time. In this country, a great impetus to cost accounting came through the work of Frederick C. Taylor. During this early period when cost systems were developing, a number of controversies took place not only as to such questions as overhead distribution but also as to what cost should include. When the importance of normal rather than actual rates of production was recognized, the next logical step was the concept of a predetermined or planned cost. Although each decade has brought refinements in techniques, emphasis on different aspects such as budgeting or distribution costs, or more recently the attempt to study the relation of cost to output, Solomons believes there is little in modern cost accounting that our fathers did not know.

The second division consisting of five essays deals with the concepts of cost. As might be expected, these articles by Theodore Lang, R. C. Edwards, and others bring out that cost concepts are much more diverse and complex than is generally assumed. In spite of the early and long controversy on such matters as whether interest should be included in cost, there are still substantial differences of opinion as to what constitutes cost. Also, costs cannot be classified into two distinct classes of fixed and variable. Even direct material cost at a particular time will differ according to the method of inventory used. As final costs are not known until the end of the accounting period, burden must be applied by the use of predetermined rates. Where there are multiple products, which is usually the case, some decision must be made about splitting up joint costs on a logical basis, or in other cases some value of a by-product must be determined as a credit to the main stream of costs. In many instances, cost is the best estimate management can make for a certain purpose.

The third section, which consists of nine articles and deals with cost as an instrument of planning and pricing, will be of particular interest to students of economics. Here will be found the excellent article on short-period price determination by R. A. Gordon, reprinted from the *American Economic Review* of June 1948, in which he reviews the Lester-Machlup controversy over marginal analysis. When we consider multiple products, selling costs, noncompetitive markets, and imperfect knowledge of demand, the marginal cost-revenue approach of the average economics text is very superficial. Because of ignorance and uncertainty, the entire analysis becomes unrealistic. Unable to deal with so many variables and with a desire for a strong and secure financial position, the businessman may rely on average total costs rather than seek maximum profits by use of marginal costs. In Gordon's opinion an explanation of business decisions resting on subjective factors is not satisfactory. The material contained in the article by Joel Dean on the break-even analysis will be familiar to American readers of economic literature. Dean contrasts this device with the flexible budget; outlines various approaches to the data by statistical, accounting, and engineering methods; and shows the difficulty

in arriving at a satisfactory means of measuring the rate of output. Dean is also careful to make the reader aware of the limitations of this management tool. In one of these essays, W. T. Baxter develops arguments for concentrating on prime cost, with an allowance for opportunity cost, instead of trying to arrive at full cost in the traditional manner. In this section, there is also an article on distribution costs, a subject which many believe has been neglected until recent years. Sections four and five are concerned with cost as a means of control and cost in the service of government.

Although the economist may not find much new material in these essays and the professional accountant or businessman may not, as a rule, be interested in topics such as the recent marginal analysis controversy, this volume does help to bring together useful material about one area of actual business practice and the economic writings on the theory of the firm. No book can cover all aspects of managerial economics. As this book is concerned with cost, it gives only a limited approach to the much broader problem of showing how economic analysis can be used to formulate business policy. These essays contain little about demand theory or the various competitive situations under which price is determined. The theorist has yet to explore selling costs in a satisfactory manner. As many of these essays were written a number of years ago, new material on topics such as statistical determination of marginal costs is not included. The student will also have to look elsewhere for an adequate discussion of the proposals now being made for accountants to measure costs and income in units of equal purchasing power instead of the ordinary dollar unit.

This book will have a definite value to students of business, for it will give them a much broader concept of cost than is gained from the usual texts. Any attempt to determine cost is beset with many difficulties. Actually, cost has no precise or objective meaning. W. H. Hamilton, in one of the concluding essays of this volume, "Cost as a Standard of Price," speaks of accountancy as a "scheme of notation, a language, a technique, . . . and a social institution" (p. 598). Expressing it more simply, we may well conclude that cost is whatever one says it is.

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Industrial Organization; Public Regulation of Business

Entflechtung und Neuordnung der westdeutschen Montanindustrie unter besonderer Berücksichtigung der Verbundwirtschaft zwischen Kohle und Eisen. By HELMUT HENNIG. (Bern: A. Francke, 1952. Pp. viii, 240 Sw. fr. 22.—.)

This well documented and carefully reasoned book deals with the effects on the German economy of the liquidation of her coal and steel combines. After a brief outline of the immediate postwar situation of these key industries and the impact of the numerous, often contradictory, laws and regula-

tions issued by the allied powers, the author demonstrates the need for horizontal and vertical integration in these industries. In his opinion, the main economic reason for horizontal integration is the greater ability of large, multiple-plant firms to withstand fluctuations in demand. In periods of recession large firms can shut down their marginal factories and concentrate production in the more efficient plants. Furthermore the expense of switching from one product to another with changes in demand is minimized, because each of the many plants controlled by one firm can specialize in one type of product. The economic advantages of vertical integration are seen in a regular supply of qualitatively uniform raw materials and reduction of transportation costs. The ability of integrated firms to allocate joint costs in a way which will reduce the price of some high cost products is believed to be particularly important. Internal subsidies make government grants unnecessary and avoid the latter's unfavorable effects on allocation of resources.

The present structure of the German coal and steel industry is illustrated with the help of 43 charts. The far-reaching economic effects of deconcentration on the efficiency of these industries are clearly demonstrated. Their competitive position in the framework of the European Coal and Steel Community is expected to be particularly unfavorable in view of the increasing integration tendencies of the other member states. Special emphasis is given to the postwar nationalization of the French, Dutch and Italian coal mines and the large-scale public (Italy) and private (France) concentration of the steel industry in other countries.

This reviewer has no quarrel with the economic arguments presented in favor of re-integration of the German coal and steel industry; this in spite of certain restrictive practices exercised by the prewar German combinations and the dominant influence of the latter on the policies of the International Steel Cartel. The prevailing consensus of European writers on the subject is that free competition in these lines of industry is unworkable. In the absence of an agreement, high fixed costs cause price wars in periods of declining demand resulting in great losses to the companies concerned. However, in the case of Germany economic considerations have to yield to political realities. France can hardly be blamed for her insistence that these *Konzerns*, keystones of the German war potential, be dissolved, even at the cost of economic inefficiency. These political factors were ignored by the author.

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The Economic Blockade. Vol. I. By W. N. MEDLICOTT. (London: H. M. Stat. Office and Longmans, Green. 1952. Pp. xiv, 732. $8.00.)

This is the first of two volumes describing the blockade activities of the British government in World War II. These activities were largely conceived and directed by the Ministry of Economic Warfare, and the two volumes will constitute the official history of MEW. Like the U. S. Board of Economic Warfare, MEW was a wartime agency dissolved shortly after the cessation of hostilities. The volume under review, which carries the story generally to mid-

1941, was drawn almost entirely from official documents, to which the author had complete access. The conclusions, however, are the responsibility of the author.

The success of the British blockade against Germany in World War I led to substantial reliance upon this instrument in the plans and hopes of the British government at the outbreak of war in 1939. As events turned out, the different character of this war resulted in the relegation of the blockade to a subsidiary rôle in the final defeat of the Axis. Nevertheless, the activities in question were pursued vigorously, especially during the first two years of the war, and their ultimate contribution to the allied victory will probably never be completely evaluated.

The purpose of the blockade was to prevent the importation into Germany, directly or indirectly, of supplies which would aid that country in the prosecution of the war. The initial and traditional system for its accomplishment was the interception and detention, by the British Navy, of vessels suspected of carrying contraband items ultimately destined for Germany. An official list of contraband was published and widely disseminated. Intercepted vessels were turned over to control bases where a careful investigation of cargoes could be made. A Contraband Committee, after investigation, decided which items should be formally seized and which allowed to proceed to their destination. In flagrant cases of contraband traffic, the carrying vessels were also seized and disposed of by decisions of the Prize Court.

The success of the blockade depended upon a number of major factors. A constant stream of information from all parts of the world was needed to determine in advance the movement of cargoes and vessels, the affiliations of consignors and consignees, the precise nature of the supplies involved and the possible uses to which they could be put. Intensive studies of the German economy were made to determine its material needs and resources, its reserve supplies, and its economic vulnerability. The various informational activities of the Ministry were directed by its Intelligence Department, but heavy reliance was placed upon British consulates and other representatives throughout the world.

A second major factor was the conduct of the blockade in such a way as to minimize the antagonism of neutrals. This was a most delicate task, especially in the case of the United States. Apart from questions of face-saving and national sovereignty, the United States government—particularly between the outbreak of war in Europe and mid-1941—had to contend with powerful internal isolationist sentiment, problems of the election year of 1940, and the occasional representations of commercial and shipping interests. A particularly thorny problem was the agitation for relief measures, including the shipment of food, to occupied and nonoccupied portions of Europe after the fall of France. The British position that such shipments would inevitably help the Axis was seriously challenged by certain groups and individuals in America, most notably represented by Herbert Hoover. In many instances, the official policy of MEW was overruled by the British Foreign Office and even by Mr. Churchill himself, when friction with the United States was concerned. This

often led to discriminatory treatment of other neutrals, with politically awkward consequences.

A third major problem was that of administration in all its ramifications. The patrol responsibilities of the thinly spread British Navy had to be minimized and concentrated in the most effective areas. This led to efforts to apply various controls at the sources of supply and to obtain restrictive agreements from neutral governments as well as from major firms and associations of exporters, importers, and shipping companies. The complex story of these negotiations is systematically presented on a country by country basis. Equally well portrayed is the development of the system of contraband controls, the use of "commercial passports" or "navicerts," and the rationing of supplies to neutral countries adjacent to Germany.

Like many wartime agencies in the United States, the Ministry suffered from rapid growing pains, insufficient personnel (especially typists), lower pay scales than competing agencies, and the frustrations of "Treasury red tape." Of interest to economists is the following observation upon the qualifications desired of MEW personnel: "It was decided from the start that although the word 'economic' was used to describe the functions of the Intelligence Department, it was not desirable to use too many individuals whose specialized training lay in the field of academic economics. For much of the work a good technical training and the capacity to weigh evidence in one or other field of applied science, or experience in applied research in such fields as engineering, transportation, and agriculture, was considered to be much more valuable than a formal training in economics. A small number of individuals with high academic qualifications in economics and statistics was, however, included in specialized fields such as finance and manpower" (pp. 66-67).

The author has done an admirable job of organizing and presenting a most complicated story. His exposition is interesting, direct, and crystal clear. The book includes statistical and documentary appendices. The complete absence of footnote documentation contributes substantially to the book's readability, without sacrificing the reader's conviction of solid reliability and sound scholarship. No doubt it was this sensible omission which made possible the completion, in something less than nine years, of a task which might easily have run to half a lifetime.

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Review of Small Business. Final Report of the Select Committee on Small Business, House of Representatives, 82nd Cong., 2nd Sess. (Washington: Supt. Docs. 1952. Pp. xv, 310.)

This report, completed during the last moments of the 82nd Congress, deals with a wide range of significant small business problems. A short introductory chapter discusses the concept of small business and sketches a framework for the remainder of the report, while wisely leaving a precise definition of "small business" to others. Eight chapters follow, each dealing with a

specific problem or related group of problems: economic controls, financing, federal taxes, government procurement, government counseling, Small Defense Plants Administration, antitrust program, and unfair competitive practices.

Indecisiveness in the post-Korean stabilization program, leading to unnecessary harassment of small businesses, is deplored, and an orderly decontrol program, leaving limited emergency price freeze authority to the President, is recommended. Although the Office of Price Stabilization is given credit for stopping scare buying, and its Office for Small Business (thought by some ex-OPS personnel to be the most useless appendage of that agency) is praised, OPS operations as a whole are severely criticized. Complaint is made of "technical procedures," "legalistic terminology," and delays in granting individual price adjustments. Also, onerous filing and record-keeping requirements are castigated. The Committee gives no indication of any awareness that standardized (*i.e.*, technical) price control procedures are alternatives to control by individual whim, that legalistic terminology may be desirable for legal documents in a world where court cases are argued by lawyers and decided by judges, and that Congressional slashing of OPS funds at a time when adjustment pressure was at a very high level may have contributed to the ensuing delays. Nor does it recognize that filing and record-keeping requirements, in addition to making available indispensable price control information, have a salutary effect on compliance and greatly simplify enforcement problems. The Committee may be on more solid ground in attacking the OPS Industry Advisory Committee program (in effect, a temporary Sherman Act suspension), procrastination in issuing tailored regulations, and the failure to roll back prices which were raised hastily during the period of so-called voluntary stabilization in anticipation of a price freeze.

To alleviate the difficulties encountered in obtaining long-term loans as a substitute for equity capital, the Committee feels that the Reconstruction Finance Corporation should be continued at least until other adequate financing methods, such as government insurance of long-term bank loans, for example, are developed. While the continuing need for large amounts of government revenue is recognized, it is pointed out that high surtaxes and excess profits taxes impose a particularly severe handicap on small firms, and that consideration should be given to revising the tax structure in several ways calculated to ease this burden. After a fairly detailed discussion of the activities of major governmental procurement agencies, the Committee concludes that although the basic procurement laws themselves are not adequate for small business protection, the administration of such law as exists has been even more inadequate.

A brief outline of federal and state counseling and informational programs is presented, together with conclusions that such programs have been more successful during emergency periods than during peacetime, and that an independent federal counseling agency is more desirable than ununified small business programs conducted by several different agencies. The activities of the Small Defense Plants Administration are described in a laudatory manner,

and a recommendation for the continuance of this agency is included. The Committee finds, and fears, a continuing trend toward economic concentration, which has been stimulated by the post-Korean semimobilization, and which has not been countered effectively by haphazard antitrust enforcement. Federal Trade Commission action, and inaction, during recent years is discussed, and most of the blame for the Commission's ineffectiveness is attributed to conflicts and low morale within the Commission, although statutory deficiency also is recognized.

Despite the fact that some passages of the report remind one of the sound and fury of those who professionally champion small business, whether or not it needs or desires a champion, the abundant factual material presented, including sixty-four tables and charts, should be very helpful in a variety of university courses dealing with the problems of small business. Provocative discussions could be developed around many of the Committee's conclusions and recommendations.

ROY J. SAMPSON

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Public Utilities; Transportation; Communications

World Airline Manual, 1952. 4th ed. (Chicago: Roy R. Roadcap. 1952. Pp. 400. $12.50.)

This reference annual appears within a year after the close of the period covered, the 1952 edition providing 1951 data. It presents statistics, as comparable as possible, for the regularly scheduled airlines of the world. That means, in this country, carriers holding certificates of public convenience and necessity from the Civil Aeronautics Board, and in other countries, carriers of equivalent status. About 40 per cent of the space is devoted to United States flag services.

Many of the data are available elsewhere, but they are conveniently brought together in this volume. For each air carrier there is presented a brief historical résumé, written in the tradition of the standard financial manuals, together with a list of officers and the firm's address. There follow certain statistical data, such as the population served, the carrier's fleet and its utilization, the volume of traffic of each type, operating revenue and expense accounts, and a balance sheet. Statistical data on foreign lines sometimes relate only to earlier years. For the smaller lines not all of these data are presented; for the larger American lines, in which there is a public stock interest, certain material of interest to the investor also appears. Most carriers have been mapped, ordinarily a simple sketch for foreign lines, while a "service density map," a diagram in which the thickness of the lines between pairs of cities indicates the number of seats (or sometimes flights, when only one type of aircraft is used) scheduled daily appears for most United States flag services. Such service density maps are also presented for the Russian Aeroflot. The maps and analysis of the Russian air service are among the most interesting aspects of the volume, any perspective on things Russian being elusive.

Sources of data are not indicated, but can often be traced. Until 1949, the Civil Aeronautics Board sporadically published an *Airline Manual,* which contained foreign data similar to those presented, as currently as possible, in the volume here reviewed. The data on United States flag airlines seem largely taken from the civil Aeronautics Board's *Recurrent Reports.* The service density maps are presumably based on analyses of the published timetables of the carriers. The corporate financial data, where presented, must have been abstracted from the companies' annual reports.

The volume would have been improved by more careful editing. For example, the recent sale by United of its subsidiary, Lamsa, to Mexican interests, is appropriately indicated in the textual description of United, but is omitted from the discussion of Lamsa. Another example appears in the operating revenue accounts of United States flag airlines. This *Manual* reproduces the unadjusted figures for mail pay, and, following the practice of the Board's *Recurrent Reports,* uses that figure in the summation of operating revenues, and hence, as the component of net income. Retroactive mail pay adjustments are so common in air transport, however, that the *Recurrent Reports* present also a separate figure for adjusted mail pay. For many purposes, a more representative result would follow if the latter figure were used in calculating operating revenues and net incomes. Adjusted mail payments are omitted from the *World Airline Manual.*

This reviewer would be unable to suggest a better published source of material on foreign airlines, although unpublished material may well be available in the files of the Civil Aeronautics Board. For the domestic airlines, however, whether the reader's intent is to find data for scholarly analysis or for financial experimentation, the appraisal must be more reserved. The manual is useful for the first approximation; but the user will probably also quite frequently need to consult the original sources.

JOHN P. CARTER

University of California

Land Economics; Agricultural Economics; Economic Geography

Introduction to Economics for Agriculture. By JOHN DONALD BLACK. (New York: Macmillan. 1953. Pp. xv, 727. $6.00.)

"This book has one clear-cut objective—to give an agricultural college student, or educated farmer or his equivalent, exactly that understanding of economics which he or she needs in order to function effectively and live happily in the world of today." So begins the preface.

The book's economic fabric is woven with strands of the economics of agriculture as the warp and with threads of the general economy as the woof. The cloth is stretched to cover much ground, a necessity if the author is to succeed in providing a single volume "intended to serve the needs both of those agricutural colleges which begin their economics with a course in the economics of agriculture and of those which begin it with a course in the

general principles of economics." The book, thus, is clearly a specialized one for which the author has an admirable, probably unequaled, experience in public service with government agencies and private groups, research, and teaching in agricultural economics at both land-grant and private universities.

If the state of advancement of a discipline were gauged by the improved calibre of college texts, agricultural economics could be judged as making progress. This book by Professor Black contributes much value-added to the stock of teaching materials available for those who prefer a specialized text. Black's text is written in view of what his experience indicates to him to be the needs of students in an agricultural college, especially those students not majoring in economics or agricultural economics and not likely to experience another course in the field. But whether to use a specialized text, rather than one on general principles, is a question to which there need be no universally valid answer.

The text's organization does not follow the current fashion. Rather than considering aggregative aspects, national income and the theory of its determination early in the book, Black introduces some elements of price and value theory immediately after orientation chapters on the organization of agriculture and its setting in a general economy. With that toe-hold, he digs into a series of seven chapters which discuss production economics at an elementary level but in much more detail than is common in the usual introductory text on general principles. Many of these pages cover the same ground as his out-of-print *Introduction to Production Economics* (1926), but it is still good teaching material except for the sections on "efficiency" and "capacity." The relative emphasis on production helps to make this book a differentiated product. So does the emphasis on consumption and commodity distribution.

The six chapters on consumption are short on demand and consumption theory, but long on the type of materials generally found in texts labeled consumption economics. This material, with the chapter on farm family living, can be of interest to those studying home economics. In this part, also, is a chapter on the currently fashionable matrix of food-people-economic development, with consideration of the situations in various countries.

The nine chapters on commodity distribution provide some discussion of price analysis as background, but the emphasis and most of the material is that usually included in a text on marketing. The rest of the book, with exceptions noted below, covers ground common to most texts on general principles. Thus, a convenient way of sharpening the differences in content between this book and the usual one on general principles is to indicate some of the things it omits or only mentions in passing and then indicate what it, but not the other, includes.

Black omits the usual amount of treatment of wages and collective bargaining, labor and industrial relations, theories of national income determination, saving, investment, and alternative economic systems. He includes much material on consumption (not demand theory) and family farm living, commodity distribution with private and cooperative marketing, price margins and

spreads, land use and tenure, agricultural and forestry credit and insurance. Common to both texts are such topics as prices and money, business cycles, equilibrium of the firm, market price determination, use and pricing of productive services, rents, international trade, and public finance. But throughout, Black emphasizes what he calls the "working out" of economic principles, leaving to the instructor most of the task of explaining the logic underlying the principles. An important exception is the economic use and pricing of productive services for which he presents the underlying logic in more detail than is usual in a beginning text.

The exposition is strongly reinforced by some 42 tables and 83 charts, all clearly labeled except one. A wealth of case material is included, and very few topics are discussed in abstract terms without reference to empirical research studies, business practices, or federal and state programs and policies. The treatment is saturated with illustrative materials, although not institutional in spirit or outlook. Instructors seeking a text with adequate case materials and examples will be satisfied. So will those who seek a text in which clarity supersedes sophistication. The writing is lucid and straightforward; the student should have no difficulty in knowing what the author is saying.

The smoothness and ease with which economic problems are discussed and disposed of may cause the mediocre or naive student to be carried away with with the notion that economists know much more than we really do. The brilliant student will wonder often and many times ask "why?" But is it not here that the instructor must play one of his necessary rôles, and how much should one expect from a single text written for the introductory level?

Now, to some evaluation of the text as a tool for teaching economics of (for or in) agriculture. A few slips in elementary analysis have crept in, including the common one of not carefully distinguishing between price elasticity and its relation to the slope at a particular point of the demand curve, as well as a confusion between price elasticity and flexibility and their relation to gross revenue so as to lead to an error concerning relative price elasticities at the farm and retail levels of demand. Those instructors who seek an elementary text which includes a rigorous exposition of economic theory will continue to seek. Those who stress theory in their lectures and desire a text rich in economic problems, the results of empirical research, and the views of a well known expert as to the "working out" of economic principles in agriculture may well find this book a bonanza. But even the brilliant student is unlikely to obtain "exactly that understanding of economics which he or she needs in order to function effectively and live happily in the world of today." A more modest objective, however, can be attained; from this book the student can learn of the types of problems with which economists struggle, if not how we fashion our brittle tools which so often prove inadequate for the tasks to which we put them.

SIDNEY HOOS

University of California, Berkeley

Agricultural Policy of the United States. By HAROLD G. HALCROW. (New York: Prentice Hall. 1953. Pp. xiv, 458. $5.50.)

Will the policy of high rigid price supports eventually bring on a consumers' revolt, possibly resulting in destruction of the entire price-support program? Are U. S. farm and price-support programs the greatest single cause of the world dollar shortage? These are current issues now being debated within and without this country, and answers to these problems must be sought.

Halcrow's timely textbook on what he calls a "tremendously complicated" subject will go some way towards helping students, political scientists, laymen and—last not least—politicians clarify their ideas on the economic implications of our agricultural policies and programs. This is the first book (others are expected soon) which deals not with isolated policy problems, but with the bulk of them: price, including storage, policies—credit—tenure—conservation, etc. Agricultural labor is one obvious omission.

The book's emphasis is on "economics" and it brings economic analysis to bear on problems of policy by using as criteria three policy objectives, namely, increasing efficiency in agriculture, raising and stabilizing farm income, and improving welfare. These objectives, and the reason for selecting them in preference to others, are discussed in Part II. The analysis of various specified policies and programs in terms of these criteria is pursued in Part III. Part I—The Agricultural Setting—is a description of the agricultural industry and an analysis of the major economic factors effecting changes in the farm population, long- and short-run agricultural production and farm income. This part contains little new material, but is a useful and logical introduction to a discussion on agricultural policy.

Halcrow's approach will satisfy only those who believe that economic analysis is adequate for a complete appraisal and understanding of our agricultural policy. This reviewer is not one of them. There is little history of agricultural policy beyond 1920 to be found in the text, though a well chosen bibliography may lead the researcher into selected subjects. Also, there is hardly any insight to be gained into the question of how actual programs and policies come into being. As a result, his book becomes a somewhat inanimate interpretation of what is actually a dynamic and dramatic phrase of our economy.

Another shortcoming is that in his ambitious effort to master such a broad field, Halcrow has inevitably oversimplified his presentation, and some readers may find it somewhat dogmatic. There are also some seemingly unnecessary repetitions (pp. 144, 165, etc.)

These qualifications do not, however, detract from what is, on the whole, a contribution to the textbook literature in which the author has attempted to treat systematically, rationally and objectively—if at times summarily—a subject with respect to which we are easily carried away by our value judgments. As a textbook for a course in agricultural policy for undergraduate students, this may be precisely what many instructors have been seeking for some time.

ERNEST FEDER

South Dakota State College

Internationale Regulierungen auf dem Weltweizenmarkt. By ANNELIESE BINDER. (Kiel: Institut für Weltwirtschaft, Universität Kiel. 1952. Pp. vi, 93. DM 8.-)

This pamphlet is one of the rapidly appearing sequence of research reports of the Institut für Weltwirtschaft of Kiel. It contains first a brief, chiefly descriptive, monograph on the domestic regulation of the wheat market of the four leading export countries (United States, Canada, Australia, and Argentina) and of the United Kingdom as the leading wheat importer (pp. 6-51). Secondly, it gives in 20 pages a similar matter-of-fact survey of the international wheat agreements. Aside from diagrams in the text and an appendix note with 18 statistical tables with the most pertinent data on wheat there is a tabulated survey on the various dates and provisions of the international wheat agreements of 1933, 1942, 1948, and 1949.

As a brief handbook relating properly arranged reliable information on historial economic facts this survey fulfills its purpose, as do many other pamphlets in this series. The study is not intended to and does not make any effort at coming to grips with the utterly complex economic and political problems involved in international commodity agreements. Hence the few scattered judgments on the merits and demerits of such agreements and on the responsibility of individual nations for certain defects are not to be taken too seriously. Of the wealth of American literature on the subject only the scantiest use has been made, indicating probably the persistent dearth of accessions to the Institut's library covering the war and postwar period.

KARL BRANDT

Stanford University

The Economic Organization of Agriculture. By THEODORE W. SCHULTZ. (New York: McGraw-Hill. 1953. Pp. xx, 374. $5.50.)

The most valuable aspect of this book is not suggested by its title. Part I, "Economic Development and Agriculture," comprising half the volume, belongs in the growing literature which is helping to round out a general theory of economic development. The remaining portions of the study, concerning the short-term instability aspects of agriculture and proposals for organizational policy, have been largely foreshadowed in the author's earlier study of *Agriculture in an Unstable Economy* for the Committee on Economic Development, although here buttressed with more data.

The author describes the book under review as a progress report, drawing heavily on recent investigations at the University of Chicago, as well as on the studies of the Bureau of Agricultural Economics. The book is distinguished by an attempt to provide an empirical foundation for major theoretical propositions which would describe the growth and instability characteristics of the agricultural sector of an evolving economy. These are seen in the peculiar light of a modified consumer's sovereignty theory, under which ordinary notions of causality concerning technology, the food supply, and population growth sometimes appear reversed, as the author acknowledges. Yet he has gone far to reduce such concepts as the income and substitution effects of changes in demand to operational, empirically verifiable terms. The

data are in the main national aggregates for the United States, with principal emphasis on the food crops. However, some illuminating extensions of the general propositions are made to explain features of agricultural behavior in underdeveloped countries.

In Part I Professor Schultz seeks to determine and measure the principal factors affecting the long-term demand for and supply of farm food products. He reviews the population characteristics associated with industrially underdeveloped ("high food drain"), transitional ("intermediate food drain"), and advanced industrial ("low food drain") economies, and concludes that the chief secular influence on the demand for food is its declining income elasticity as population uncoils and the income level increases. An attempt is made to assign magnitudes to the relevant income elasticities.

On the supply side the chief factor is the advance in agricultural techniques, which, operating against the declining secular rate of increase in demand, brings about the chronic surplus (or "farm") problem of advanced economies. This is in contrast to the "food" problem of underdeveloped economies, where increases in output tend to be absorbed by increases in population (unless farm families come to prefer the substitution of property for children). The high productivity of modern agriculture in advanced countries is also shown to account for the declining relative importance of land as a factor limiting economic growth.

The discussion of the development of farm technology is rather unsatisfactory, largely because the author chooses to confine himself to the relatively recent and prospective contributions of publicly supported research agencies. In the lexicon of consumer's sovereignty, this leads to the curious description of the director of an agricultural experiment station as an "entrepreneur," who makes input-output calculations in response to a community preference schedule to "produce" new techniques. The fact that virtually all of this occurs outside a market mechanism makes the discussion little more than a playful analogy, but the implication is left that some day, when the tools of economic analysis have been sufficiently whetted, the processes of scientific judgment and political decision-making involved in such cases will be quantified and empirically tested under the requisite preference schedules and transformation curves.

More important, however, the discussion makes only passing reference to the essential process of pure research by virtue of which most of the particular applications of the experiment stations have been made possible (*e.g.*, the genetic basis of hybrid seed corn), and the highly important process of mechanical invention and adaptation for the most part carried on in private hands, which has been chiefly responsible for the mechanization of agriculture. The fact that these processes cannot be reduced to marginal-cost-vs.-marginal-product curves should not lead to their neglect in a description of the process of economic development. Though not readily quantifiable, they are certainly subject to empirical study.

Having considered the long-term demand and supply aspects of agriculture, Schultz turns to the questions, "What particular circumstances give rise

to the process of economic development? Why does this process occur so unevenly, more especially, why does it by-pass entire communities within an economy, say within a country having well-established internal trade and migration?" These questions remain largely unanswered, but the tentative conclusion is advanced that the disparate rates of growth can chiefly be explained in terms of differences in location, which turns out to be not a matter of physical distances, but of access to alternative economic opportunities. While this factor is undoubtedly significant, one wonders at the omission of reference to differences in availability of suitable techniques from one crop region to another, and at the ready dismissal of the influence of social institutions on the rates of introduction of new techniques and adjustments. Again, the latter can be defined in quite specific terms, although their effects are not subject to precise mensuration, *e.g.*, in the South; slavery (and its successors, sharecropping and racial discrimination), plantation agriculture, the crop-lien credit system, and the discouragement of immigration, among others. A theory which is applicable to the underdeveloped countries of the world cannot avoid dealing with factors of this type.

In Part II the author provides data concerning the underlying causes of economic instability in agriculture. Instability is explained in terms of large and abrupt shifts over short intervals in the demand and supply schedules, both of which are subject to relatively low price elasticities. On the supply side the inputs for agriculture as a whole are shown to be remarkably stable, and the fluctuations in supply are therefore attributed chiefly to variations in yield resulting from weather conditions. These variations are analyzed by regions and products. In considering the effect which producer decisions may have on supply during the time between harvests, Schultz cites the interesting case of a backward-sloping supply schedule during famine periods in countries such as India, where an increase in food prices results in a reduction of supply because farmers are enabled to consume more of their own product. In such cases the operation of the price system cannot be depended upon to correct the maldistribution, as the early medieval advocates of price control in the western world long ago showed that they well understood.

Part III presents a variety of proposals for dealing with problems of uneven economic development and agricultural instability. In this brief review it is impossible to comment on these in detail, but it should be remarked that the section abounds in richness of suggestion. Despite the criticisms which have been made, the book as a whole merits study by others than those concerned principally with agricultural problems because of its application of empirical method, the boldness of its hypotheses, and its flashes of speculative insight into the process of economic evolution.

JAMES H. STREET

Rutgers University

Labor

The Harvest Labor Market in California. By LLOYD H. FISHER. (Cambridge: Harvard University Press. London: Oxford University Press. 1953. Pp. viii, 183. $4.50.)

The market for casual labor in agriculture presents many vexing problems, intellectual and social. Professor Fisher has revealed them fully in this penetrating analysis. The book begins with an economic theory of the harvest labor market. It then traces the history of labor contracting in California agriculture, and outlines its present status. The concluding chapters deal with wage-fixing by employers associations and the government.

Fisher's sympathies were clearly with the farm laborer. However, this did not prevent him from understanding thoroughly the motives and functions of growers and labor contractors. This ability to portray vividly a situation that has often been tragic and sometimes violent without creating any villains is one mark of the true social scientist.

Although Fisher was a professor of political science, he has employed economic analysis extensively, expertly, and at times originally in this work. The few flaws in his economics are all minor. For example, he assumes (p. 82) that "ideal" conditions of atomistic competition preclude a formal market organization such as an exchange; it would be more nearly correct to say that they require one.

Fisher's convincing explanations of the origins of various piecework pay practices will be of value to labor economists. Such practices are more easily understood in the simple harvest situation than in more complex industrial situations. His analysis of the demand for harvest larbor is an ingenious extension of the theory of the firm to an unusual situation.

Students of culture and of trade unions will be particularly interested in the discussion of the differences in the rôle of the labor contractor in different ethnic groups. According to Fisher, the Japanese or Filipino contractor performs functions close to those of a union leader; the Mexican, Negro, or native white contractor is a petty entrepreneur who acts as an agent for the grower.

It is in the analysis of the rôle of government that Fisher's interest in political processes comes to the fore. Growers dominated the administrative machinery for setting wage ceilings on agricultural labor during World War II, and Fisher's discussion shows deep concern over the domination of a public body by an interested group. Yet, bad though this may be in principle, it is not clear that it produced bad policy in this case. An economist might have called into question goals of government policy that seem here to be accepted at face value. Growers were reluctant to set wage ceilings for fear that labor supplies might be jeopardized; worker representation would surely have reinforced this reluctance. The neglected interest must then be that of the consumer; yet consumers as a group may have had more to gain from large harvests than from low wages. In other cases, production has been

impaired by wage ceilings for low-paid, arduous work during periods of labor shortage.

The central problem of the book is that of providing an adequate work force for the intense labor demands of the harvest, demands that are often concentrated in a brief period of time, and at the same time offering to the worker some reasonable continuity of employment and a decent annual income. Related to this are a host of subsidiary problems: housing for migrant workers, schooling for their children, protection against the occasional dishonest or irresponsible contractor who recruits labor and fails to provide work, or who defaults on obligations to the worker. The problems of immigration from Mexico, legal and illegal, are also closely related. Although the book reviews the solutions to these problems that have been advanced by others, it espouses none. A trade union, in Fisher's opinion, would be more nearly able to decasualize labor and perform the functions of the contractor than would a government employment service. Yet he recognized that reform either by unions or government would be resisted bitterly and with almost certain success by growers and contractors. It is in part political realism or even pessimism that distinguishes Fisher's position from that of such reformers as Carey McWilliams.

The style of this book is clear, concise, and colorful. Quotations from newspapers, committee hearings, and similar sources are used to good advantage.

Though *The Harvest Labor Market in California* is narrow in scope, it is exceedingly broad in its treatment of its subject. Though it is analytical, it is nevertheless human. It is impossible to read it without feeling the greatness of the loss to social science caused by Lloyd Fisher's untimely death.

ALBERT REES

University of Chicago

Strikes: A Study in Industrial Conflict—with Special Reference to British Experience Between 1911 and 1947. By K. G. J. C. KNOWLES. (New York: Philosophical Library. 1952. Pp. xiv, 330. $8.75.)

Mr. Knowles' two-part study is a meticulous statistical analysis of strikes in England over a 37-year period, prefaced by a qualitative description of the institutional developments affecting industrial militancy and hence, strike statistics.

The book's central theme is the changed character of British strikes, the shift from prolonged industrial battles of the past to today's lightning "protest demonstrations," and the reasons for this transformation. The trade union movement itself rather than political and legal restrictions is seen by the author as the principal cause of strike de-emphasis. While official union policy has shifted to reliance upon negotiating machinery and "responsible dependence" upon government, the strike has become a method of rebellion by the distrustful rank-and-file members against both the peace-oriented union and a benefit-providing government. Increasingly since the General Strike of

1926, and almost exclusively since the out-break of World War II strikes have been unofficial—unsupported by the union organizations. The author suggests that the unofficial strike may be "an essential safety-valve under a system of national collective bargaining," while the official strike will languish "as long as political methods of achieving social and economic objectives" are available. This theme's treatment reveals a nostalgia for the less complicated days of old-fashioned strike action prior to the development of elaborate peace machinery and politically oriented unionism. This attitude is probably related to the author's expressed sympathy for rank-and-file worker expression which is cramped in an era of union and government bureaucracy.

After providing in Part A a description of the impact on employer-employee relations of unions, employer associations and government, the author, a member of the Oxford Institute of Statistics, demonstrates the usefulness, as well as the limitations, of strike statistics. In Part B the causes and effects of strike activity are assessed carefully, presenting available governmental statistics for the years 1911 to 1947 in a series of excellent graphs and clearly labeled tables. Standardized "strike-proneness" ratios for major British industries and geographical regions are constructed. The author concludes that regional influences on striking are "to a large extent industrial causes in disguise."

Although a statistician, Knowles emphasizes the underlying social and psychological "imponderables" as causes of strikes, while discounting the immediate causes which are subject to classification and quantification. (". . . in practice, the cause may be no more than the last straw.") In evaluating the "tenuous" statistical evidence on the effects of strikes, the results in terms of wage increases secured and production lost are found to be small. Again Knowles selects a factor which "cannot be measured at all," the general economic context within which strikes occur, as of major importance in determining actual strike costs. Throughout the study the author's acute awareness of the limited validity of statistical interpretation of strike behavior is evident, while acknowledgment (and use) is made of the contributions of the social sciences. Frequent references to American studies, such as Florence Peterson's *Strikes in the United States, 1880-1936,* and Warner and Low's *The Social System of the Modern Factory,* relate the British evidence to American experience.

Numerous sections of the five chapters which comprise the book are short essays which may be read separately with profit. Such varied subjects as the General Strike of 1926, women in strikes, fatigue and frustration, organized strike-breaking, breakaway unions and joint union-management committees are explored with pertinent reference to the contributions of other writers. Greater integration of these essays would have been desirable; their discrete excellence is not a substitute for relational significance. Although the large number of footnotes may slow reading pace, they provide such an array of historical illustrations, interesting sidelights and on occasion droll humor that eye excursions to the bottom of each page soon become habitual. Appendices within chapters and at the end of the book present more detailed information

on the statistical procedures utilized. Suggestions for improving the collection and classification of strike statistics are made in the final appendix. The extensive footnote citations of both American and British sources serve in lieu of a bibliography.

Knowles proves well his contention that statistical description, despite its limitations has "an essential place in the systematizing of empirical knowledge." Intuitive generalizations about the trends in British strikes in recent decades—their frequency, size, duration, officially listed causes and results—are rendered unnecessary by the availability of this quantified experience data. However, the inability of statistical analysis to plumb the ultimate motivations and attitudes of workers and employers in conflict situations constitutes a challenge, well recognized by the author, to the disciplines which may contribute to a science of human behavior.

This study of industrial conflict in transition is a happy blend of statistical exactitude and imaginative social insights which American students of the labor movement and social groups should find of value, whatever the nature of their specialized discipline or methodological preference.

KENNETH M. THOMPSON

Louisiana State University

TITLES OF NEW BOOKS

Economic Theory; General Economics

DE JONG, F. J. *De Werking van een Volkshuishouding een eerste inleiding tot het economische denken.* Vol. 1. (Leiden: H. E. Stenfert Kroese. 1953. Pp. xvi, 324. f.7.75.)

FRIEDMAN, M. *Essays in positive economics.* (Chicago: Univ. of Chicago Press. 1953. Pp. vi, 328. $5.75.)

GEARTY, P. W. *The economic thought of Monsignor John A. Ryan.* (Washington: Catholic Univ. of America Press. 1953. Pp. viii, 341. $4.)

HUNOLD, A., ed. *Wirtschaft ohne wunder.* (Erlenbach-Zürich: Eugen Reutsch Verlag. 1953. Pp. 359. Paper, fr.11.95; cloth, fr.15.40.)

Contributors to the volume include L. Einaudi, F. A. Hayek, W. Röpke, A. Rüstow, F. Baudhuin, L. Erhard, H. D. Gideonse, F. Nemschak, J. Rueff, P. Baffi, F. W. Meyer, C. Mötteli, R. Mueller, V. Muthesius, E. Welter.

HAMILTON, D. *Newtonian classicism and Darwinian institutionalism—a study of change in economic theory.* (Albuquerque: Univ. of New Mexico Press. 1953. Pp. 138. $1.)

KEIRSTEAD, B. S. *An essay in the theory of profits and income distribution.* (New York: Augustus Kelley. Oxford: Basil Blackwell. 1953. Pp. 110. $1.75.)

PAQUET, A. *Le conflit historique entre la loi des débouchés et le principe de la demande effective.* Centre d'Etudes Economiques stud. no. 7. (Paris: Lib. Armand Colin. 1953. Pp. 368.)

ROBINSON, J. *On re-reading Marx.* (Cambridge, Eng.: Students' Bookshops. 1953. Pp. 23. 2/-.)

Joan Robinson undoubtedly had a lot of fun writing these three short essays, and many readers will find them amusing as well as provocative. Two of the three, "Would You Believe It?" and "An Open Letter from a Keynesian to a Marxist," make some interesting comparisons between Marshall, Keynes, and Marx. The other, "A Lecture Delivered at Oxford by a Cambridge Economist," is concerned with the notions of equilibrium and change over time, with illustrations from Marshall, Keynes and Marx.

SLOAN, H. S. and ZURCHER, A. J. *A dictionary of economics.* 3rd ed. (New York: Barnes & Noble. 1953. Pp. viii, 356. $3.25.)

VINCI, F. *I fondamenti dell'economica.* (Milan: Istituto Editoriale Cisalpino. 1953. Pp. 318.)

WALKER, H. M. and LEV, J. *Statistical inference.* (New York: Henry Holt. 1953. Pp. xi, 508. $6.25.)

International economic papers, vol. 2. Translations prepared for the Internat. Econ. Assoc. (London and New York: Macmillan. 1953. Pp. 232. $3.50.)

Economic History; National Economies; Economic Development

DE ROOVER, R. *L'évolution de la lettre de change, XIV-XVIII siècles.* (Paris: Lib. Armand Colin. 1953. Pp. 240. 850 fr.)

DESAI, R. C. *Standard of living in India and Pakistan, 1931-32 to 1940-41.* (Bombay: Popular Book Depot. 1953. Pp. xvii, 286. Rs. 20/-.)

FARNSWORTH, C. R. *The agriculture of Uruguay.* Pub. of the Office of For. Agric. Relations. (Washington: Supt. Docs. 1952. Pp. 133.)

FRANKEL, S. H. *The economic impact on under-developed societies: essays on international*

investment and social change. (Cambridge: Harvard Univ. Press. 1953. Pp. vii, 179. $3.25.)

These essays, all of which have appeared previously, "are linked together by the basic economic problem which in one way or another underlies all of them: that of the clash between the functional forces of modern industrialism and the rapidly disintegrating indigenous economies of communities governed by forms of social organization unable to yield the living standards increasingly being demanded by all the peoples of the world" (from the Preface). Part I includes essays concerned with conceptual aspects of the problem; and Part II is made up of essays applying these concepts to Africa.

LACOUR-GAYET, J., ed. *Histoire du commerce:* vol. II—*Le commerce extra-Européen jusqu' aux temps modernes;* vol. IV—*Le commerce du XV^e siècle au milieu de XIX^e siècle;* vol. V—*Le commerce depuis le milieu du XIX^e siècle.* (Paris: SPID. 1953; 1951; 1952. Pp. 551; 394; 444.)

MUNSHI, M. C. *Industrial efficiency.* (Bombay: Vora & Co. 1953. Pp. 281. $2.)

This is a treatment of the subject of economic development and controlled economy in which the importance of measures for the increase of industrial efficiency is stressed. Particular attention is paid to problems of the economy of India. Measures of industrial efficiency are considered.

MURPHEY, R. *Shanghai: key to modern China.* (Cambridge: Harvard Univ. Press. 1953. Pp. xii, 232. $4.50.)

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NOTES

Announcements of Retirements

The practice of publishing annually a list of members of the profession retiring from active teaching at the close of each academic year will be continued. Such list will be published in the March 1954 issue. Department heads of colleges and universities will be asked to submit the names of members of their staffs who will become emeritus in June 1954. Individuals who wish to be included in the list are asked to advise department heads or the editor of the *Review* not later than January 4, 1954.

Publications

A volume on *The Teaching of Economics*, sponsored by the International Economic Association and UNESCO is to be published in April 1954. The volume consists of reports and papers on this subject presented at the Talloires Conference, August 27-30, 1951. Members of the American Economic Association will be able to purchase the volume, through the Secretary, at a reduced price. Further particulars will be provided in the March number of the *Review*.

Economic Abstracts

The Library of the Economic Information Service of the Netherlands Ministry of Economic Affairs in collaboration with the Library of the Netherlands School of Economics and the Library of the Ministry of Social Affairs is publishing a periodical entitled *Economic Abstracts*—a semi-monthly review of abstracts on economics, finance, trade and industry, management and labour. Annual subscription rate outside of the Netherlands is Guilders 27.50. The periodical may be obtained through booksellers or from the publisher, Martinus Nijhoff, The Hague, Netherlands. Abstracts published in the form of documentary cards, as described in the September 1952 number of this *Review*, continue to be available on a subscription basis.

Research Fellowships and Grants

The Social Science Research Council has announced fellowships and grants of two distinct types to be offered in 1954: (1) Those designed exclusively to afford training in research in social science and designated as *Research Training Fellowships* and *Undergraduate Research Stipends;* (2) Those designed to aid scholars of established competence in the execution of their research, namely, the *Faculty Research Fellowships* and *Grants-in-Aid of Research*. The latter awards are not available to students working for degrees.

Inquiries should be addressed to the Social Science Research Council, 726 Jackson Place, N.W., Washington 6, D.C., and applications, on forms provided by the Council, must be filed not later than January 4, 1954.

It is to be noted that *Area Research Training Fellowships* and *Travel Grants for Area Research* are no longer available.

Deaths

Arthur A. Bright, Jr., died May 14, 1953.

Theodore T. Bullock, professor of economics and business law in the College of Business Administration of the University of Nebraska, died September 22, 1953.

Eli F. Heckscher, honorary member of the American Economic Association, died December 23, 1952.

Maurice C. Latta, assistant professor of economics in the College of Business Administration of the University of Nebraska, died September 12, 1953.

Nicholas W. Rodin, research associate in the Russian Economics Project and lecturer in McCoy College, Johns Hopkins University, died October 7, 1953.

O. M. W. Sprague, professor emeritus of Harvard University, died May 24, 1953.

Donald H. Wallace, director of the Woodrow Wilson School of Public and International Affairs, Princeton University, died September 19, 1953.

Retirements

J. I. Falconer, head of the department of agricultural economics and rural sociology, Ohio State University, June, 1953.

Clarence Heer, Kenan professor of economics, University of North Carolina.

Solomon S. Huebner, as emeritus professor of insurance, the Wharton School, University of Pennsylvania, July, 1953.

D. D. Lescohier, as emeritus professor of economics, University of Wisconsin.

George A. MacFarland, as emeritus professor of accounting, the Wharton School, University of Pennsylvania, July, 1953.

William H. Spencer, Hobart W. Williams distinguished service professor of law and business, School of Business, University of Chicago, September, 1953.

John B. Woosley, Kenan professor of finance, University of North Carolina.

Appointments and Resignations

Walter Adams, of Michigan State College, has been appointed to Attorney General Brownell's Committee to Study the Antitrust Laws. He is currently studying at Harvard Law School on a Ford Foundation grant.

Mortimer Andron has been promoted from assistant professor to associate professor of economics at the University of California, Santa Barbara College.

Robert L. Aronson has been promoted from assistant professor to associate professor in the School of Industrial and Labor Relations, Cornell University.

Arthur Ashbrook, Jr., formerly of Duke University, is now assistant professor of economics at Carnegie Institute of Technology.

Lowell DeW. Ashby has been promoted to professor of economics at the University of North Carolina and has been granted a leave of absence for 1953-54 to pursue postdoctoral study at Harvard University under a Fund for the Advancement of Education fellowship.

Robert W. Austin has been promoted from lecturer to professor of business administration at Harvard Business School.

Eric Axilrod has joined the staff of the College of Business Administration, Butler University as associate professor of economics.

Nathan A. Baily has been promoted from associate professor to professor of economics and business administration at American University.

Henry H. Bakken has been promoted from associate professor to professor of agricultural economics at the University of Wisconsin.

Richard J. Bannon, of the Catholic University of America, has accepted an appointment to the accounting staff of DePaul University.

Edward M. Barnet has been appointed acting assistant dean and acting director of development in the Graduate School of Business, Columbia University.

W. H. Baughn has been promoted to professor of business administration at Louisiana State University.

William J. Baumol is on leave of absence from Princeton University and will be visiting professor of economics at the University of California, Berkeley, in the spring semester.

James H. Blackman, formerly of Johns Hopkins University, has been appointed associate professor of economics at the University of South Carolina.

V. W. Bladen has resigned as director of the Institute of Business Administration and has been appointed chairman of the department of political economy at the University of Toronto.

Calvin P. Blair has been appointed instructor in economics at the University of Texas.

Roy G. Blakey, of the University of Minnesota, has been requested by the University of Ankara and the U.S. Department of State to continue as professor of public finance at the University of Ankara through 1953-54.

James W. Bennett, Jr., has been promoted from assistant professor to associate professor of transportation in the College of Business Administration, University of Tennessee.

George D. Bodenhorn has been appointed assistant professor of business statistics in the Amos Tuck School, Dartmouth College.

D. J. Bogue has been appointed associate director of the Scripps Foundation for Research in Population Problems at Miami University.

Russell Bowers, of Emory University and the University of Georgia, Atlanta, has been appointed visiting professor in the College of Business Administration, University of Georgia, Athens, for the Fall quarter.

Jess W. Brandon has been appointed assistant professor of accounting at the University of Miami.

Arthur Brodshatzer has been appointed assistant professor of accounting at the State College of Washington.

Douglas S. Brown has taken a position as director of training at Manufacturers National Bank of Detroit.

Milton P. Brown has been promoted from assistant professor to associate professor of business administration in the Harvard Business School.

Pembroke H. Brown, retired from the University of Illinois, is teaching at Indiana State Teachers College, Terre Haute, in the current academic year.

Karl Brunner has been promoted to associate professor of economics at the University of California at Los Angeles.

Robert B. Buchele has been appointed assistant dean of the School of Business Administration, University of California at Los Angeles.

K. A. H. Buckley has been promoted to associate professor of economics at the University of Saskatchewan.

Harvey C. Bunke has been appointed assistant professor of transportation at the State University of Iowa.

Robert L. Bunting has returned to the University of North Carolina as assistant professor of economics after having been on leave for military service.

E. Douglas Burdick has been promoted from associate professor to professor in the economic and social statistics department of the Wharton School, University of Pennsylvania.

Carl R. Bye has been named dean of the Graduate School at Syracuse University. He will continue as associate dean of the Maxwell School but will no longer serve as chairman of the department of economics.

G. R. Bythewood has been appointed instructor in business administration at Louisiana State University.

Harold R. Capener has been appointed associate professor in the department of agricultural economics and rural sociology of Ohio State University.

Alfred Carlip has been appointed instructor in economics at Wesleyan University.

Thomas H. Carroll, dean of the School of Business Administration at the University of North Carolina, has been appointed director of the Division of Economic Development of the Ford Foundation for the year 1953-54.

K. Laurence Chang has been appointed instructor in business administration at the University of Dayton.

Stanley Chipper, formerly of Alma College, has been appointed lecturer in economics at Michigan State College.

J. W. Chisholm has been promoted to associate professor of economics at Louisiana State University.

Carl P. Ciosek has resigned as instructor in economics at the University of Connecticut.

Robert L. Clodius has been promoted from assistant professor to associate professor in the department of agricultural economics, University of Wisconsin.

Sanford Cohen has been appointed assistant professor of economics at Western Reserve University.

Marshall R. Colberg has been promoted to professor of economics at Florida State University.

Arnold Collery has been appointed instructor in economics at Amherst College.

Lewis C. Copeland has been appointed lecturer in statistics in the College of Business Administration, University of Tennessee.

John R. Craf has been named dean of the School of Business, University of Louisville.

M. E. Cravens, Jr., has been appointed associate professor in the department of agricultural economics and rural sociology of Ohio State University.

Wilfrid H. Crook, of Colgate University, was on leave in the spring semester for research study on the general strike under a grant from the Social Science Research Foundation.

John T. Croteau, formerly of the Catholic University of America, has been appointed associate professor at the University of Notre Dame.

Donald Cullen has been appointed assistant professor in the School of Industrial and Labor Relations, Cornell University.

John H. Cumberland has been appointed assistant director and research associate professor in the Bureau of Business and Economic Research of the College of Business and Public Administration, University of Maryland.

M. Gordon Daniels has been appointed instructor in economics at Texas Agricultural and Mechanical College.

Kenneth R. Davis has resigned from the University of North Carolina to join the faculty of the Amos Tuck School, Dartmouth College, as assistant professor of marketing.

Lloyd DeBoer has been appointed instructor in marketing at the University of Illinois.

S. Joseph DeBrum, formerly of SCAP, has been promoted to professor of business and assistant director, School of World Business, San Francisco State College.

Walter H. Delaplane has been named dean of the School of Arts and Sciences of Texas Agricultural and Mechanical College.

Robert R. Dince has been appointed assistant professor in the College of Business Administration, University of Georgia.

Riley S. Dougan has been appointed instructor in the department of agricultural economics and rural sociology of Ohio State University.

Richard A. Easterlin has been promoted from instructor to assistant professor of economics at the Wharton School, University of Pennsylvania.

H. C. Eastman has been appointed lecturer in the department of political economy at the University of Toronto.

Elvis L. Eckles has been promoted from instructor to assistant professor of economics at the University of Illinois.

Bruce E. Edwards, formerly of the University of Michigan, has been appointed instructor in economics at the University of Illinois.

G. A. Elliott has been granted a year's leave of absence from the University of Toronto to accept a fellowship from the Guggenheim Foundation.

Edward G. Emerling has been appointed instructor in economics at the Catholic University of America.

M. Erselcuk, on leave from Purdue University, is teaching at the University of Mandalay, Burma, under a Fulbright grant.

Khodadad Farmanfarmaian, formerly of the University of Colorado, has been appointed instructor in economics at Brown University.

Blair C. Ferguson has been appointed instructor in economics at Washington and Jefferson College.

Leo Fishman has been granted leave from West Virginia University to accept a Ford Foundation faculty fellowship.

J. Anderson Fitzgerald is on leave from the University of Texas to serve in the Education Division of the Mutual Security Agency in Bangkok, Thailand until April 1954.

John R. Fitzpatrick has been appointed lecturer in labor law at the Catholic University of America.

Dwight P. Flanders has been promoted from associate professor to professor of economics at the University of Illinois.

Minard I. Foster has been appointed assistant professor of marketing at the University of Miami School of Business Administration.

George N. Francis has been promoted from assistant professor to associate professor of accounting at Los Angeles State College of Applied Arts and Sciences.

Gerald F. Franklin has been promoted from instructor to assistant professor of economics at the University of Miami.

William C. Frederick has been appointed assistant professor of economics at the University of Tampa.

Robert Freedman, of Colgate University, is director of the Colgate Economics Study Group at Knoxville, Tennessee, in the current semester.

Irwin Friend has been promoted from lecturer to research professor of finance at the Wharton School, University of Pennsylvania.

John L. Fulmer, formerly of the University of Virginia, is now associate professor of business administration at Emory University.

Merrill M. Gaffney has been appointed instructor in economics at the University of Oregon.

Lowell N. George has resigned as head of the economics department of Muskingum College to take a position in the Training Division of the Goodyear Tire and Rubber Company.

Frank R. J. Gerard, formerly with J. Walter Thompson Co., in India, and with the Canadian Bank of Commerce, has been appointed lecturer in foreign advertising and marketing at the School of World Business, San Francisco State College.

James A. Gerding has been appointed lecturer in management in the School of Business, Indiana University.

Robert A. Goodell has joined the faculty of the University of Maryland as assistant professor of business organization.

Charles S. Goodman has been promoted from assistant professor to associate professor of marketing and foreign commerce at the Wharton School, University of Pennsylvania.

Oscar R. Goodman has been appointed associate professor of business administration at the State College of Washington.

Michael Gort has been appointed associate in economics at the University of California, Berkeley.

Wytze Gorter has been promoted to associate professor of economics at the University of California, Los Angeles.

G. K. Goundrey has been appointed lecturer in the department of political economy, University of Toronto.

Truman F. Graf has been promoted from instructor to assistant professor of economics at the University of Wisconsin.

F. J. Guerra has been appointed instructor in accounting at Louisiana State University.

Editha Hadcock has been promoted from associate professor to professor of economics at De Pauw University.

Morris Hamburg has been promoted from instructor to assistant professor of statistics at the Wharton School, University of Pennsylvania.

Rector R. Hardin has resigned from the University of Georgia to become head of the economics department, Howard College, Birmingham, Alabama.

William H. Harris has been appointed assistant professor of business administration in the College of Business Administration, University of Georgia.

J. W. Harvey has been appointed lecturer in the department of political economy in the University of Toronto.

Robert O. Harvey, formerly of Indiana University, has been appointed assistant professor of economics at the University of Illinois.

Everett D. Hawkins has returned to Mount Holyoke College after serving the Department of State in Indonesia and Washington the past two years.

Ralph C. Heath is now assistant professor of transportation at the University of Washington after having completed a tour of active duty with the Air Force.

K. F. Helleiner has been promoted from assistant professor to associate professor in the department of political economy, University of Toronto.

Charles N. Henning has been promoted to associate professor of finance in the College of Business Administration, University of Washington.

William C. Henry has been promoted from associate professor to professor of accounting at the University of Tennessee.

W. L. Heuser has been appointed instructor in economics at Louisiana State University.

Charles M. Hewitt, of the University of Alabama, is visiting lecturer in business law at Indiana University in the current academic year.

C. Addison Hickman has resigned from the University of Illinois to accept an appointment as head of the department of economics, University of North Carolina State College, Raleigh.

Howard L. Hoag has been promoted from instructor to assistant professor of economics at Purdue University.

Donald S. Holm, Jr., has been promoted to associate professor of business management at the University of Missouri.

Richard H. Holton has been appointed assistant professor of economics at Harvard University.

Joseph S. Hopson, of the University of Texas, has been appointed assistant professor of accounting in the College of Business Administration, University of Georgia.

L. L. Hsiao has been appointed instructor in economics at Lafayette College.

Harriet D. Hudson has resigned from the University of Illinois to accept a deanship at Randolph-Macon College.

Holland Hunter has been promoted to associate professor of economics at Haverford College and is acting chairman of the department of economics.

Neil H. Jacoby, of the University of California at Los Angeles, has been appointed to the Council of Economic Advisers.

F. Thomas Juster has been appointed instructor in economics at Amherst College.

Robert Kane has been appointed instructor in management in the School of Business Administration, University of Miami.

K. William Kapp has been promoted to professor of economics at Brooklyn College.

Arthur Karasz has been appointed United Nations technical consultant to the Central Bank of Bolivia.

Robert L. Katz has been appointed assistant professor of business administration at the Amos Tuck School, Dartmouth College.

Peter Keir, formerly of Amherst College, is now with the Board of Governors of the Federal Reserve Board in Washington, D.C.

Richard J. Kempe, formerly economist in the Department of Commerce, has been appointed economic editor of the National Committee for a Free Europe's magazine *News from Behind the Iron Curtain*.

Hugh B. Killough has been appointed chairman of the department of economics at Brown University.

Charles A. Kirkpatrick has been promoted to professor of marketing at the University of North Carolina.

Chester A. Kline has been promoted from assistant professor to associate professor in the insurance department, Wharton School, University of Pennsylvania.

William A. Knoke has been promoted to associate professor in the department of marketing, State University of Iowa.

David L. Koefod, formerly of the University of Minnesota, has been appointed assistant professor and research assistant in the Amos Tuck School, Dartmouth College.

Irving B. Kravis has been promoted from assistant professor to associate professor of economics in the Wharton School, University of Pennsylvania.

Edwin Kuh has been appointed lecturer in political economy at the Johns Hopkins University for the current academic year.

Frederick C. Kurtz, of George Washington University, has been appointed assistant professor of accounting in the College of Commerce, West Virginia University.

Nathan Lacher has been appointed lecturer in accounting at the Catholic University of America.

Harold Q. Langenderfer has been appointed assistant professor of accounting at the University of North Carolina.

Thomas P. Lantos has resigned from San Francisco State College to accept a position in the economics department of the Bank of America.

William L. Larger has been appointed instructor in marketing in the School of Business, University of Louisville.

Harold J. Leavitt has been appointed associate professor of business administration in the School of Business of the University of Chicago, effective January 1, 1954. He is now serving as lecturer in University College.

Leonard A. Lecht has resigned as assistant professor of economics at the University of Texas to accept a position at Carleton College.

William N. Leonard, formerly of Pennsylvania State College, is now chairman of the department of economics and of the division of social science at Hofstra College.

Theodore H. Levin has been promoted from assistant professor to associate professor of economics and business administration at American University.

John M. Lishan has been appointed acting assistant professor of economics at the University of California, Los Angeles.

Charles R. Lockyer has been appointed research associate at the Bureau of Business Research of the University of Kentucky.

Clarence D. Long, on leave from the Johns Hopkins University, is serving as a member of the staff of the Council of Economic Advisers.

Lawrence F. Mansfield has been appointed assistant professor of economics at the University of Tennessee.

Edward Marcus, of Brooklyn College, has received a grant from the Merrill Foundation for research on the effects of business cycles on U.S. imports in the post-World War II period.

Shelly M. Mark, formerly chief economist of the Hawaii Office of Price Stabilization, has resumed full time teaching duties at the University of Hawaii.

Donald B. Marsh has been appointed Bronfman professor of economics at McGill University.

Will E. Mason has been appointed assistant professor of economics at Washington and Jefferson College.

John W. May has been promoted to professor of economics at Washington and Jefferson College.

Roy W. Mayberry, Jr., has been appointed instructor in economics in the College of Commerce, West Virginia University.

Thomas Mayer, of Columbia University, has been appointed assistant professor of economics in the College of Commerce, West Virginia University.

Kenneth McCaffree is on leave from the University of Washington to serve with the Industrial Relations Division of the Atomic Energy Commission at Richland, Washington.

Campbell R. McConnell has been appointed assistant professor of economics in the College of Business Administration of the University of Nebraska.

John W. McConnell, on leave from the School of Industrial and Labor Relations, Cornell University, is teaching at the University of Patna, India, on a Fulbright grant.

Archibald M. McIsaac has been appointed chairman of the department of economics in the Maxwell School of Syracuse University, succeeding Carl R. Bye.

S. Sterling McMillan has been appointed chairman of the department of economics at Western Reserve University.

James E. McNulty, Jr., has been promoted from lecturer to assistant professor of business economics in the School of Business Administration, University of California at Los Angeles.

Leon A. Mears, formerly of the Teaching Institute of Economics of the University of California, has been appointed associate professor of production management in the School of World Business, San Francisco State College.

Robert W. Merry has been promoted from associate professor to professor of business administration at Harvard Business School.

Raymond F. Mikesell is on leave of absence from the University of Virginia in the first semester of this year to teach in the National War College in Washington.

Ervin Miller has been promoted from instructor to assistant professor of finance in the Wharton School, University of Pennsylvania.

Frank B. Miller, Jr., has been appointed research associate in the School of Industrial and Labor Relations, Cornell University.

William G. Modrow has been appointed instructor in economics at Texas Agricultural and Mechanical College.

Franklin G. Moore, of Northwestern University, is visiting professor of production management for the year 1953-54 at the University of California at Los Angeles.

John R. Moore has been appointed instructor in economics in the College of Business Administration of the University of Tennessee.

James A. Morris, of the University of South Carolina, has been granted a Ford Foundation fellowship for study in England at Oxford University and at the London School of Economics.

Herbert C. Morton has been appointed assistant professor and research editor in the Amos Tuck School, Dartmouth College.

George L. Moss has been appointed assistant professor of accounting at the University of Miami.

John C. Murdock has been promoted to assistant professor of economics at the University of Missouri.

Oscar S. Nelson has been promoted from associate professor to professor of accounting in the Wharton School, University of Pennsylvania.

Alfred Nicols has been promoted from assistant professor to associate professor of business economics in the School of Business Administration, University of California at Los Angeles.

William H. Nicholls is on leave of absence from Vanderbilt University to serve on the staff of the Council of Economic Advisers.

Kenji Okuda has been appointed acting assistant professor of economics for the year 1953-54 at State College of Washington.

Robert F. Olberding has been appointed instructor in business organization and management in the College of Business Administration, University of Nebraska.

C. S. Overmiller has resigned from Louisiana State University to accept a position with the Federal Reserve Bank of Atlanta.

James M. Parrish has been promoted to lecturer in economics and has been appointed assistant dean of the School of Business Administration of the University of North Carolina.

James Parthemos has been appointed assistant professor of economics at the University of South Carolina.

Robert W. Paterson, of the University of Virginia, has been appointed associate professor of economics and director of the recently organized Bureau of Business and Economic Research at the University of South Carolina.

Robert T. Patterson has been appointed assistant professor in the department of economics, School of Commerce, New York University.

Ralph W. Pfouts, of the University of North Carolina, has been given leave to study at Cambridge University on a postdoctoral fellowship awarded him by the Social Science Research Council.

Almarin Phillips has been promoted from instructor to assistant professor of economics in the Wharton School, University of Pennsylvania.

Harold J. Plous has been promoted from instructor to assistant professor of economics at the University of California, Santa Barbara College.

Jack E. Prince has been appointed assistant professor of economics at Ohio Wesleyan University.

Charles R. Purdy has been appointed instructor in business organization and management in the College of Business Administration of the University of Nebraska.

Donald L. Raun, formerly of Washington State College, is now assistant professor of accounting at Los Angeles State College of Applied Arts and Sciences.

Robert Rauner, of the London School of Economics, has been appointed instructor in economics at Trinity College.

Robert Risley has been appointed assistant professor in the School of Industrial and Labor Relations, Cornell University.

George W. Robbins has been appointed acting dean of the School of Business Administration, University of California at Los Angeles.

Evan O. Roberts has been promoted to professor of economics and marketing in the College of Commerce, West Virginia University.

Marshall A. Robinson has been appointed assistant director of research and assistant professor of finance at the Amos Tuck School, Dartmouth College.

Robert M. Robinson has been appointed associate in economics at the University of California, Berkeley.

Murray Ross has been appointed lecturer in economics in the Catholic University of America.

Eugene Rotwein has been promoted from assistant professor to associate professor of economics at the University of Wisconsin.

Charles A. Rovetta, formerly of the School of Business, University of Chicago, has been appointed dean of the School of Business, Florida State University.

Roy J. Sampson has been appointed assistant professor of business administration and economics at Pacific University.

Lester C. Sartorius has resigned from the University of Illinois to accept a position as director of marketing research with Deere and Company in Moline, Illinois.

Dwight D. Saunders has been appointed instructor in economics at the University of Oklahoma.

Howard G. Schaller has been appointed assistant professor of economics in the College of Business Administration of the University of Tennessee.

Fred Schiller has been appointed instructor in economics at Lafayette College.

Harold B. Schmidhauser is visiting professor in the School of Industrial and Labor Relations, Cornell University.

Carlton R. Schroeder has been appointed instructor in economic geography at the State College of Washington.

Morton J. Schussheim has been appointed lecturer in economics at Western Reserve University.

Eli Schwartz has been appointed lecturer in economics at Michigan State College.

Robert Sedgwick has been promoted to assistant professor of economics at Syracuse University.

Sherman Shapiro has been appointed assistant professor of economics at the University of Texas.

Ansel Sharp has been appointed instructor in economics at Louisiana State University.

Louis Shere, of Indiana University, has accepted a one-year appointment to the staff of the Council of Economic Advisers.

G. Findlay Shirras has been appointed visiting professor of economics at the University of Florida.

B. F. Sliger has been appointed assistant professor of economics at Louisiana State University.

Hayden W. Smith has been appointed acting assistant professor of economics at the University of California, Davis.

Spencer M. Smith has been appointed assistant professor of economics in the College of Business and Public Administration of the University of Maryland.

Louise Sommer is visiting professor of economics at American University.

George A. Steiner has returned to the University of Illinois after a two-years' leave of absence during which he served in the Defense Production Administration and the Office of Defense Mobilization.

Bryce D. Stone has been appointed instructor in economics in the College of Business Administration of the University of Tennessee.

Adolf Sturmthal, of Bard College, is visiting professor in the School of Industrial and Labor Relations, Cornell University.

S. Stykolt has resigned as lecturer in the Institute of Business Administration and has been appointed lecturer in the department of political economy in the University of Toronto.

G. Winston Summerhill is visiting lecturer in business administration at the University of North Carolina.

Ancel G. Taflinger has been appointed assistant professor of business administration at the State College of Washington.

Howard M. Teaf, Jr., on leave from Haverford College, is visiting professor at the Institute of Social Studies, The Hague.

Carey C. Thompson has been granted a leave of absence from the University of Texas to accept a fellowship from the Fund for the Advancement of Education.

R. W. Thompson, of the University of Toronto, has been appointed assistant professor in the department of political economy of McMaster University.

Warren S. Thompson has retired from the Scripps Foundation for Research in Population Studies at Miami University. He is at present engaged in a study of California population sponsored by the John Randolph Haynes and Dora Haynes Foundation of Los Angeles.

Gene B. Tipton has joined the staff of Los Angeles State College of Applied Arts and Sciences as a lecturer in economics.

L. Reed Tripp has been promoted from the rank of associate professor to professor of economics at the University of Wisconsin.

Donald S. Tucker, professor emeritus of economics at Massachusetts Institute of Technology, will again be visiting professor of economics at De Pauw University the second semester of the current academic year.

Lloyd Valentine has been appointed visiting assistant professor of business administration at Louisiana State University.

Paul M. Van Arsdell has been appointed associate dean of the College of Commerce and Business Administration at the University of Illinois.

Paul A. Vatter has been promoted from instructor to assistant professor of statistics in the Wharton School, University of Pennsylvania.

Hugh G. Wales has been promoted from associate professor to professor of marketing at the University of Illinois.

Arthur E. Warner has resigned from Indiana University to accept an appointment as assistant professor of real estate at Michigan State.

Eleanor Webber has been appointed instructor in economics at New Jersey College for Women, Rutgers University.

Emanuel T. Weiler has resigned from the University of Illinois to become head of the department of economics at Purdue University, succeeding James A. Estey now full-time professor of economics.

Samuel Weiss has been appointed lecturer in statistics at the Catholic University of America.

Ernest D. Wenrick has a position with the Tennessee Valley Authority.

Thomas Wenzlau has been appointed instructor in economics at Wesleyan University.

J. Fred Weston, associate professor of finance, has been named associate dean of student affairs at the University of California at Los Angeles.

P. K. Whelpton has resigned as director of the Population Division of the United Nations to return to Miami University as director of the Scripps Foundation for Research in Population Problems.

Thomas L. Whisler has resigned from the University of Missouri to accept a position as assistant professor in the School of Business of the University of Chicago.

William L. Williams has been appointed instructor in accounting at the University of Georgia.

Edwin E. Witte, on leave from the University of Wisconsin, is teaching at the New York State School of Industrial and Labor Relations, Cornell University, in the first semester.

Walter F. Wolf has been appointed instructor in economics at the University of Connecticut.

Norman J. Wood has been promoted from instructor to assistant professor of economics in the College of Business Administration, University of Tennessee.

Wallace O. Yoder has been appointed assistant director of the Bureau of Business Research and faculty lecturer in business administration in the School of Business of Indiana University.

Edwin Young has been appointed chairman of the department of economics at the University of Wisconsin.

Alois L. Zaremba, of Ohio State University, has been appointed lecturer in economics at Western Reserve University.

VACANCIES AND APPLICATIONS

The Association is glad to render service to applicants who wish to make known their availability for positions in the field of economics and to administrative officers of colleges and universities and to others who are seeking to fill vacancies.

The officers of the Association take no responsibility for making a selection among the applicants or following up the results. The Secretary's Office will merely afford a central point for clearing inquiries; and the *Review* will publish in this section brief description of vacancies announced and of applications submitted (with necessary editorial changes). Since the Association has no other way of knowing whether or not this section is performing a real service, the Secretary would appreciate receiving notification of appointments made as a result of these announcements. It is optional with those submitting such announcements to publish name and address or to use a key number. Deadlines for the four issues of the *Review* are February 1, May 1, August 1, and November 1.

Communications should be addressed to: The Secretary, American Economic Association, Northwestern University, Evanston, Illinois.

Vacancies

Research in economic security: National organization located in Chicago seeks person with wide research background and knowledge of survey work, preferably with some experience in conducting meetings and educational programs. P158

Business administration and economics: Man with doctor's degree for college teaching appointment in Northeast. Previous teaching experience not altogether essential. P162

Marketing and sales professor: Wanted for full-time teaching position in main city in northern Mexico. Needed for September, 1954. Spanish speaking necessary. Give full background information. P163

Economists Available for Positions

Labor, business and government, international public finance systems, history, theory, sociology, public administration: Man, Ph.D., Wisconsin, 1945. Ten years of teaching and government research and administration, writing; engaged in liberal arts college extension teaching and consultation with state agency; could be available currently but wishes summer, 1954, appointment leading to consideration for subsequent faculty position. Western location preferred. E158

International economics, economics of underdeveloped countries, Middle East area specialist, economic history, comparative economic systems: Man, Ph.D. Professor of economics; broad research experience; desires summer teaching for 1954. E219

Current business analysis, economic forecasting, business cycles, market research, national income and product analysis: Man, 36, married, M.A., Ph.D. requirements nearly completed. Ten years of experience in analysis of current economic developments and in forecasting; 5 years as economic analyst-writer on staff of nationally known business magazine; brief university teaching experience in current economic problems but qualified to teach business cycles, money and banking, fiscal policy and related fields. Desires research-analysis or teaching position. E224

Statistics, theory, finance econometrics, industrial relations: Man, 31, Ph.D., Chicago. Five years of teaching and governmental experience; occasional consultant for statistical research projects; publications. Desires position in Midwestern university. Available either February, June, or September, 1954. Also interested in possible assignment for summer, 1954. E358

International economics, principles, theory, history of economic thought, economic history, economic systems, money and banking, labor: Man, 41, married, Ph.D. Experience with Federal Security Agency, War Labor Board, UNRRA; university teaching and administrative experience; predoctoral research at London School of Economics. Now with private organization. Seeks position at college or university. E373

Principles, air transportation, international economics, history of economic thought, labor economics, economic systems; allied areas, e.g., international organization, social psychology, etc.; interested in interdisciplinary approach to social sciences: Man, 33,

B.A. (economics, education), M.A. (economics), Ph.D. (economics, psychology). Twelve years of research experience in various areas of economics and social sciences; currently employed in federal government. Desires teaching position in economics. E420

Business law, social control of business, history of economic thought: Man, 37, Ph.D., LL.B. Experienced, effective teacher; publications. E439

Labor, comparative economic systems, current economic problems, economic history, economic and social thought, money and banking, public finance, international trade, personnel and manpower policy: Man, 37, married, M.A., and Ph.D. residence completed at Columbia University. Six years of teaching economics and social science as well as background in adult education; 3 years as editor and research director in the book publishing and public relations field dealing with labor relations; 3 years of personnel and industrial relations work in industry; market and opinion research experience. Interested in teaching, research, writing, editorial and/or administrative positions. E434

International economics, labor, housing, economic principles and theory, economic development: Man, 35, Ph.D. Broad teaching, research, and government experience; presently with U.S. Mission to N.A.T.O. Desires teaching or research position. Available in September, 1954. E441

American economic history, corporation finance, business cycles, economic theory, statistics, economic principles: Man, 27, married, B.A., New York University; M.A., Columbia; mechanical engineering training, Polytechnic Institute of Brooklyn. Seeks part-time evening position teaching at a college in the New York metropolitan area. E456

Marketing research analysis: Above young man also seeks marketing research analyst position with a consulting engineering firm in the New York area to combine his educational training with his experience as a Social Science Analyst for the Bureau of the Census and marketing director for the Israel Bond Drive in Nassau County. Contacts in both industry and government. Excellent references available upon request from the Placement Office, Columbia University. E456

Economic geography, economic history, economic policy, international trade, industry (especially location) studies, economic development, European, Asian, African affairs: Man, 38, married, Ph.D. Six years of graduate and undergraduate teaching experience; also research and writing; now teaching in Eastern university. E462

International economics, trade and banking, European area specialist: Man, married, LL.D., Ph.D. Resident in Canada for three years; willing to relocate. Experience in diplomatic and civil service, top-level international finance, industry, particularly export-import field, research, writing, broadcasting, lecturing. Seeks teaching or research position. E471

Market analysis, finance, urban land economics: Man, 36, married; course work completed for Ph.D. Fourteen years of private and government experience in operations and research in market analysis, industrial location and economic development, urban redevelopment and housing. Available in January, 1954, as consultant or staff economist. E477

Economic principles, economic history, economic thought, labor economics, comparative systems, public finance, price and price policies: Man, A.M., Northwestern, Ph.D., Yale. Eighteen years of teaching experience; research in economic history; volume on regional agricultural and population problems completed; economics experience as section chief in government service; private business and industrial background for 8 years. Available in September, 1953. E479

Industrial economics, international trade, economic policy, international relations and economics, foreign markets: Man, 51, married, European studies. Practical experience in responsible positions in industry, organization and control, foreign trade, trasportation, economic investigations and statistics; specialized in agricultural and food industry. Offers his 30 years of experience, together with command of several languages and knowledge of foreign countries, both in Europe and America. Seeks position in industry, economic research, control or investigations, and/or teaching. E481

Finance, labor economics, money and banking, theory: Man, 31, married, B.A. equivalent, University of Chicago, M.B.A., University of Denver, Ph.D. thesis in preparation, University of Colorado. Two years of teaching at Universities of Colorado and Denver. Desires teaching position. Available immediately. E487

Marketing, economics, industrial relations: Man, 33, B.S., M.B.A., course requirements completed for Ph.D. in business administration. Business experience. Interested in teaching or research position. Available immediately. E488

Economic research: Man, 27, married; B.A. in Economics, New York University (minors in government and history). Veteran; military writer in Army Air Corps. Will relocate. E489

Real estate; finance, investments, economic analysis, portfolio management, urban land economics, housing: Man, 31, married, B.S. plus legal training. Seven years of broad real estate experience, including own firm; part-time lecturer on college faculty; publications and acknowledgments. Presently in institutional investment work; interested in business, financial, or institutional connection offering responsibility and opportunity. E490

Money and banking, investments, business economics, economic analysis, corporate finance, international economics: Man, 35, B.S., M.A., requirements for Ph.D. nearly completed. Ten years of experience in finance and investment; 1 year of teaching experience at outstanding Midwestern university; completed research in finance; extensive experience in public speaking. Desires teaching position. Also interested in research and analysis. Available immediately. E491

Economic theory, public finance, business fluctuations, industrial organization, money and banking, statistics, international economics, economic history: Man, 35, married; Ph.D. residence and examination requirements completed at Columbia; in final stage of writing dissertation. Three years of university teaching experience; several years of research experience and of experience in federal government; also interested in public relations and administration. Desires research or teaching position; references can be obtained from Placement Bureau, Columbia University. Available immediately. E492

Fiscal and international economics: Man, 36, B.S., Kent State University, graduate work at Kent and Indiana University. Veteran; 6 years of experience as economist in various countries for U.S. Government; served as chief of several sections—two in economic research and programming, one in surveying and research; teaching and forum experience; also much experience in conducting meetings with civic, private, and government groups, such as chambers of commerce, mayors' associations, etc. Available immediately. E493

International trade, money and banking, labor economics, economic theory, history of economic thought, industrial management: Man, 28, B.A., M.A., Ph.D. Thesis on problems of foreign trade and economic development in countries of Southeast Asia and other underdeveloped countries. Brief experience in foreign trade and teaching. Desires an academic or nonacademic position. Available immediately. E494

International economics, national economies, national income analysis, economic fluctuations, labor problems, social and political theory, sociology: Man, 44, B.A., Ph.D., Harvard. Seven and a half years of teaching, 1½ as department head; 10 years of experience as government economic analyst, of which last 5 years abroad; numerous publications. Desires to return to responsible academic post in the U.S. Available in September, 1954, but can be interviewed in the U.S. in December, 1953, and January, 1954. E495

Money and banking, public finance, labor economics, economic principles, business finance, statistics: Man, 28, married, A.B., University of Washington, M.S., Columbia; Ph.D. expected in December, 1953, Columbia. Three years of teaching experience at large Eastern university; research in credit policy; some business experience. Desires research, analysis, or teaching position. Available immediately. E496

Transportation, traffic management, public utilities, economics, marketing, accounting: Man, 50, married, M.B.A., near Ph.D. Eighteen years of teaching and administrative experience in leading universities; also practical experience in transportation field.

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Principles, industrial relations, labor, sociology: Man, 31, M.A., Minnesota, half of doctorate course work completed. Veteran; research experience in industrial relations, regional economics; taught supervision courses; publications. Available immediately for academic or nonacademic position. E498

Business economics, business forecasting, economic and marketing analysis: Man, 36, married, Ph.D. Broad experience in analyzing business problems, forecasting business activity, prices, and product demand; also experience in finance and municipal security analysis; presently employed as economic analyst with a nationally known corporation. Desires position as economic analyst for advancement. E499

Economics, statistics, industrial and business analysis: Woman, 50, A.B., University of Denver, course requirements for Ph.D. in economics completed, American University. Fifteen years of experience in government service; 10 years in private industry. Prefers a foreign assignment with an American firm. E500

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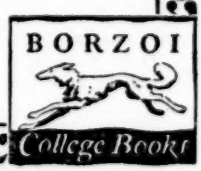

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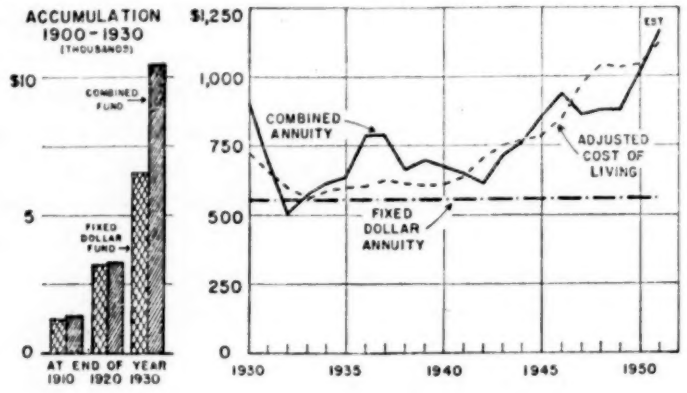

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CONTENTS

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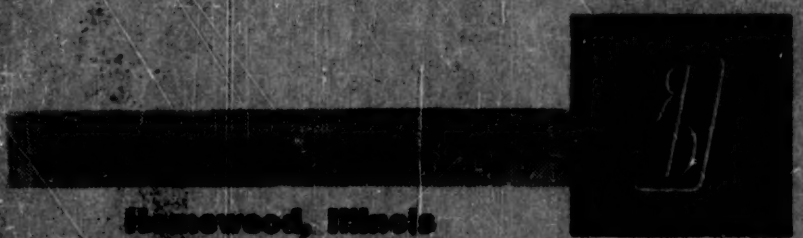

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